$299.00

Cisco Remote Access

Additional reference for RMTAC / Remote Access CCNP exam
(instructor led course)

Jaffson and 14th

Jaffson Motel (3 Blocks walk)

→ ~~Jaffson~~ left on Jaffson

→ half block on your left handside

---

keep going on ~~Jaffson~~ 14th

2 or 3 blocks

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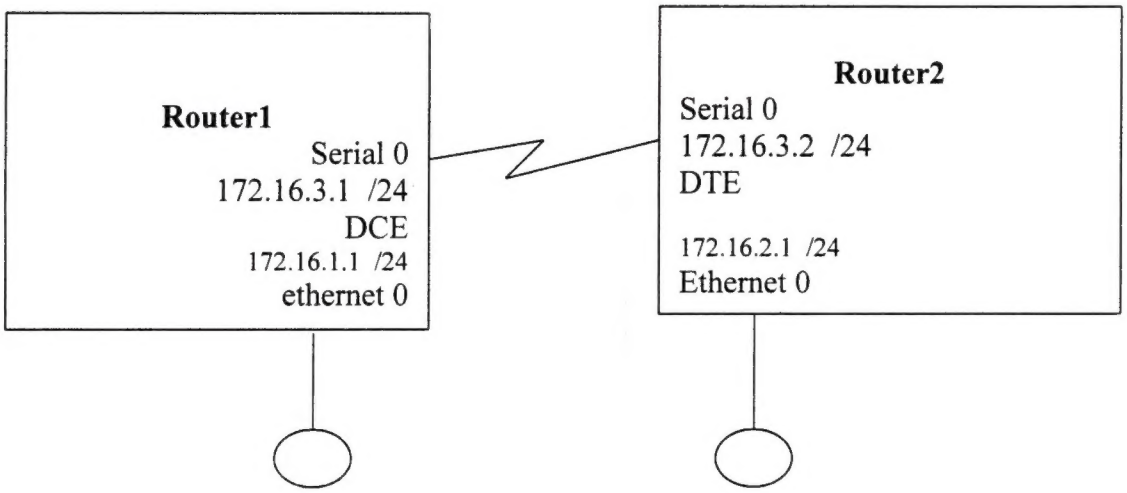
Legacy DDR configuration

Router1 will be configured for DTR dialing to place a call to rouuter2 using DDR, Dial on Demand Routing. Router2 will be configured to receive calls from router1. The 3 basic steps to configure legacy DDR are:
1) Specify interesting traffic 2) Define static routes 3) Configure the dialer to place or receive calls



Config t
Hostname router1
Ip routing
Int ethernet 0
Ip address 172.16.1.1 255.255.255.0
No shutdown

Dialer-list 5 protocol ip permit (1) ← interesting traffic
Ip route 172.16.2.0 255.255.255.0 serial 0

Interface serial 0
Ip address 172.16.3.1 255.255.255.0
Encapsulation ppp
Ppp authentication chap
Clock rate 56000
Dialer dtr
Dialer string 5551313
Dialer idle-timeout 60
Dialer map 172.16.3.2 name router2 5551313 (1)
Pulse-time 1
Dialer-group 5
No shutdown
Exit
Username router2 password 12345
router1#

Config t
hostname router2
ip routing
int ethernet 0
ip address 172.16.2.1 255.255.255.0
no shutdown

ip route 0.0.0.0 0.0.0.0 serial 0

interface serial 0
ip address 172.16.3.2 255.255.255.0
encapsulation ppp
ppp authentication chap
dialer in-band
pulse-time 1
dialer map ip 172.16.3.1 name router1
no shutdown
exit
username router1 password 12345

match

```
router1#show run
Building configuration...

Current configuration:
!
version 11.0
service udp-small-servers
service tcp-small-servers
!
hostname router1
!
enable secret 5 $1$KMps$lO4CbAc4mgbUGjXLigbSj1
enable password 12345
!
username router2 password 7 06575D72181B
!
interface Ethernet0
 ip address 172.16.1.1 255.255.255.0
!
interface Ethernet1
 no ip address
 shutdown
!
interface Serial0
 ip address 172.16.3.1 255.255.255.0
 encapsulation ppp
 dialer dtr
 dialer idle-timeout 60
 dialer string 5551313
 dialer map ip 172.16.3.2 name router2 5551313
 dialer-group 5
 no fair-queue
 clockrate 56000
 ppp authentication chap
 pulse-time 1
!
interface Serial1
 no ip address
 shutdown
!
ip route 172.16.2.0 255.255.255.0 Serial0
dialer-list 5 protocol ip permit
!
line con 0
line aux 0
 transport input all
line vty 0 4
 password 12345
 login
!
end

router1#
```

```
router2#show run
Building configuration...

Current configuration:
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname router2
!
logging buffered 4096 debugging
enable secret 5 $1$S4un$E5M0EFnglE7hX4DyOIfz0/
enable password 12345
!
username router1 password 0 12345
ip subnet-zero
!
!
!
interface Ethernet0
 ip address 172.16.2.1 255.255.255.0
 no ip directed-broadcast
!
interface Serial0
 ip address 172.16.3.2 255.255.255.0
 no ip directed-broadcast
 encapsulation ppp
 dialer in-band
 dialer map ip 172.16.3.1 name router1
 pulse-time 1
 ppp authentication chap
!
ip classless
ip route 0.0.0.0 0.0.0.0 Serial0
!
!
line con 0
 transport input none
line 1
line vty 0 4
 password 12345
 login
!
end

router2#
router2#
```

Router1 status before DDR is activated by interesting traffic !!

```
router1#show int s0
Serial0 is up (spoofing), line protocol is up (spoofing)
  Hardware is HD64570
  Internet address is 172.16.3.1 255.255.255.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation PPP, loopback not set, keepalive set (10 sec)
  DTR is pulsed for 1 seconds on reset
  LCP Closed
  Closed: ipcp
  Last input 0:11:21, output 0:11:21, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     145 packets input, 4490 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     163 packets output, 5826 bytes, 0 underruns
     0 output errors, 0 collisions, 52 interface resets, 0 restarts
     0 output buffer failures, 0 output buffers swapped out
     73 carrier transitions
     DCD=down  DSR=down  DTR=up  RTS=up  CTS=down
router1#
router1#show dialer
Serial0 - dialer type = DTR SYNC
Idle timer (60 secs), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs)

Dial String      Successes   Failures    Last called   Last status
  --                   0          0        never                    DTR dialer
5551313                0          0        never                    Default
5551313                0          0        never

router1#
router1#debug dialer
Dial on Demand debugging is on
router1#
router1#debug ppp ?
  chap         Challenge Authentication Protocol
  error        Protocol errors and error statistics
  multilink    Multilink activity
  negotiation  Protocol parameter negotiation
  packet       Low-level PPP packet dump

router1#debug ppp chap
PPP CHAP authentication debugging is on
router1#
router1#show debugging
PPP:
  PPP CHAP authentication debugging is on
Dial on demand:
  Dial on Demand debugging is on
router1#
```

Router1 will ping router2 to cause interesting traffic and activate DDR

```
router1#
router1#ping 172.16.2.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.2.1, timeout is 2 seconds:
```

```
Serial0: Dialing cause: Serial0: ip PERMIT
Serial0:No holdq created - not configured
Serial0: Attempting to dial DTR..
%LINK-3-UPDOWN: Interface Serial0, changed state to up.!!
Success rate is 40 percent (2/5), round-trip min/avg/max = 36/40/44 ms
router1#
PPP Serial0: Send CHAP challenge id=1 to remote
PPP Serial0: CHAP challenge from router2
PPP Serial0: Passed CHAP authentication with remote.
PPP Serial0: CHAP response id=1 received from router2
PPP Serial0: Send CHAP success id=1 to remote
PPP Serial0: remote passed CHAP authentication.
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed state to up
```

now we get 100% ping success !!!

```
router1#
router1#ping 172.16.2.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.2.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 36/38/40 ms
```

Router1 status with DDR activated !!

```
router1#
router1#show int s0
Serial0 is up, line protocol is up
  Hardware is HD64570
  Internet address is 172.16.3.1 255.255.255.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation PPP, loopback not set, keepalive set (10 sec)
  DTR is pulsed for 1 seconds on reset
  LCP Open
  Open: ipcp
  Last input 0:00:00, output 0:00:00, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     174 packets input, 5588 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     193 packets output, 6937 bytes, 0 underruns
     0 output errors, 0 collisions, 54 interface resets, 0 restarts
     0 output buffer failures, 0 output buffers swapped out
     73 carrier transitions
     DCD=up  DSR=up  DTR=up  RTS=up  CTS=up
router1#
router1#
router1#show dialer
Serial0 - dialer type = DTR SYNC
Idle timer (60 secs), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs)
Time until disconnect 47 secs
Current call connected 0:01:14
Connected to 5551313 (router2)

Dial String      Successes   Failures    Last called   Last status
  --                   1          0        0:01:14      Successful   DTR dialer
5551313                1          0        0:01:14      Successful     Default
5551313                0          0        never
router1#
router1#
```

Now wait over 60 seconds (dialer idle-timeout 60) and the DDR connection will terminate because there is no longer any traffic

```
router1#
Serial0: idle timeout
Serial0: disconnecting call
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed state to down
%LINK-3-UPDOWN: Interface Serial0, changed state to down
router1#
router1#
Serial0: re-enable timeout
router1#
router1#
router1#
router1#show int s0
Serial0 is up (spoofing), line protocol is up (spoofing)
  Hardware is HD64570
  Internet address is 172.16.3.1 255.255.255.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation PPP, loopback not set, keepalive set (10 sec)
  DTR is pulsed for 1 seconds on reset
  LCP Closed
  Closed: ipcp
  Last input 0:00:33, output 0:00:33, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     184 packets input, 5748 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     203 packets output, 7097 bytes, 0 underruns
     0 output errors, 0 collisions, 59 interface resets, 0 restarts
     0 output buffer failures, 0 output buffers swapped out
     76 carrier transitions
     DCD=down  DSR=down  DTR=up  RTS=up  CTS=down
router1#
router1#
router1#show dialer
Serial0 - dialer type = DTR SYNC
Idle timer (60 secs), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs)

Dial String      Successes   Failures    Last called   Last status
  --                   1          0        0:02:37      Successful   DTR dialer
5551313                1          0        0:02:37      Successful     Default
5551313                0          0        never


router1#
router1#
```

router2 status before DDR is activated

```
router2#show int s0
Serial0 is up (spoofing), line protocol is up (spoofing)
  Hardware is QUICC Serial
  Internet address is 172.16.3.2/24
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation PPP, loopback not set, keepalive set (10 sec)
  DTR is pulsed for 1 seconds on reset
  LCP Closed
  Closed: IPCP, CDPCP
  Last input 00:03:04, output 00:03:04, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
     Conversations  0/1/256 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     157 packets input, 4879 bytes, 0 no buffer
     Received 157 broadcasts, 0 runts, 0 giants, 0 throttles
     1 input errors, 0 CRC, 1 frame, 0 overrun, 0 ignored, 0 abort
     149 packets output, 4776 bytes, 0 underruns
     0 output errors, 0 collisions, 36 interface resets
     0 output buffer failures, 0 output buffers swapped out
     21 carrier transitions
     DCD=down  DSR=down  DTR=up  RTS=up  CTS=down

router2#
router2#
router2#show dialer

Serial0 - dialer type = IN-BAND SYNC NO-PARITY
Idle timer (120 secs), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs)
Dialer state is idle

Dial String      Successes   Failures    Last called   Last status


router2#
router2#
router2#show debugging
Dial on demand:
  Dial on demand events debugging is on
PPP:
  PPP authentication debugging is on
router2#
router2#
router2#
```

Interesting traffic and DDR causing router2's interface to come up

```
router2#
00:54:10: %LINK-3-UPDOWN: Interface Serial0, changed state to up
00:54:10: Serial0: Dialer received incoming call from <unknown>
00:54:10: Se0 PPP: Treating connection as a callin
00:54:12: Se0 PPP: Phase is AUTHENTICATING, by both
00:54:12: Se0 CHAP: O CHALLENGE id 7 len 28 from "router2"
00:54:12: Se0 CHAP: I CHALLENGE id 1 len 16 from "router1"
00:54:12: Se0 CHAP: Waiting for peer to authenticate first
00:54:12: Se0 CHAP: I RESPONSE id 7 len 28 from "router1"
00:54:12: Se0 CHAP: O SUCCESS id 7 len 4
00:54:12: Se0 CHAP: Processing saved Challenge, id 1
00:54:12: Se0 CHAP: O RESPONSE id 1 len 28 from "router2"
00:54:12: Se0 CHAP: I SUCCESS id 1 len 4
00:54:12: dialer Protocol up for Se0
00:54:13: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed state to
up
router2#
router2#
router2#show int s0
Serial0 is up, line protocol is up
  Hardware is QUICC Serial
  Internet address is 172.16.3.2/24
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation PPP, loopback not set, keepalive set (10 sec)
  DTR is pulsed for 1 seconds on reset
  Time to interface disconnect:  idle 00:01:38
  LCP Open
  Listen: CDPCP
  Open: IPCP
  Last input 00:00:01, output 00:00:01, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
     Conversations  0/1/256 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     172 packets input, 5134 bytes, 0 no buffer
     Received 172 broadcasts, 0 runts, 0 giants, 0 throttles
     1 input errors, 0 CRC, 1 frame, 0 overrun, 0 ignored, 0 abort
     163 packets output, 5018 bytes, 0 underruns
     0 output errors, 0 collisions, 36 interface resets
     0 output buffer failures, 0 output buffers swapped out
     23 carrier transitions
     DCD=up  DSR=up  DTR=up  RTS=up  CTS=up

router2#
```

```
router2#show dialer

Serial0 - dialer type = IN-BAND SYNC NO-PARITY
Idle timer (120 secs), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs)
Dialer state is data link layer up
Time until disconnect 92 secs
Connected to <unknown phone number> (router1)

Dial String      Successes   Failures    Last called   Last status
```

Router1 idle-timeout expires !!

```
router2#
router2#
router2#
00:55:13: %LINK-3-UPDOWN: Interface Serial0, changed state to down
00:55:14: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed state to
down
router2#
00:55:28: Serial0: re-enable timeout
router2#
router2#show dialer

Serial0 - dialer type = IN-BAND SYNC NO-PARITY
Idle timer (120 secs), Fast idle timer (20 secs)
Wait for carrier (30 secs), Re-enable (15 secs)
Dialer state is idle

Dial String      Successes   Failures    Last called   Last status


router2#
```

Some DDR help files for reference !!!

```
Interface serial 0

router2(config-if)# ?
Interface configuration commands:
  access-expression           Build a bridge boolean access expression
  arp                         Set arp type (arpa, probe, snap) or timeout
  autodetect                  Autodetect Encapsulations on Serial interface
  bandwidth                   Set bandwidth informational parameter
  bridge-group                Transparent bridging interface parameters
  carrier-delay               Specify delay for interface transitions
  cdp                         CDP interface subcommands
  clock                       Configure serial interface clock
  custom-queue-list           Assign a custom queue list to an interface
  dce-terminal-timing-enable  Enable DCE terminal timing
  default                     Set a command to its defaults
  delay                       Specify interface throughput delay
  description                 Interface specific description
  dialer                      Dial-on-demand routing (DDR) commands
  dialer-group                Assign interface to dialer-list
  down-when-looped            Force looped serial interface down
  dxi                         ATM-DXI configuration commands
  encapsulation               Set encapsulation type for an interface
  exit                        Exit from interface configuration mode
  fair-queue                  Enable Fair Queuing on an Interface
  frame-relay                 Set frame relay parameters
  full-duplex                 Configure full-duplex operational mode
  half-duplex                 Configure half-duplex and related commands
  help                        Description of the interactive help system
  hold-queue                  Set hold queue depth
  idle-character              Set idle character type
  ignore-dcd                  ignore dcd
  invert                      Serial invert modes
  ip                          Interface Internet Protocol config commands
  ipx                         Novell/IPX interface subcommands
  keepalive                   Enable keepalive
  llc2                        LLC2 Interface Subcommands
  load-interval               Specify interval for load calculation for
                              an interface
  logging                     Configure logging for interface
  loopback                    Configure internal loopback on an interface
  mac-address                 Manually set interface MAC address
  map-group                   Configure static map group
  mtu                         Set the interface Maximum Transmission Unit
                              (MTU)
  netbios                     Use a defined NETBIOS access list or enable
                              name-caching
  no                          Negate a command or set its defaults
  nrzi-encoding               Enable use of NRZI encoding
  physical-layer              Configure sync or async physical layer on
  ppp                         Point-to-Point Protocol
  priority-group              Assign a priority group to an interface
  pulse-time                  Enables pulsing of DTR during resets
  random-detect               Enable Weighted Random Early Detection
                             (WRED) on an Interface
  serial                      serial interface commands
  shutdown                    Shutdown the selected interface
  smds                        Modify SMDS parameters
  snapshot                    Configure snapshot support on the interface
```

```
  snmp                    Modify SNMP interface parameters
  timeout                 Define timeout values for this interface
  traffic-shape           Enable Traffic Shaping on an Interface or
                          Sub-Interface
  transmit-interface      Assign a transmit interface to a receive-
                          only interface
  transmitter-delay       Set dead-time after transmitting a datagram
  tx-queue-limit          Configure card level transmit queue limit
```

```
router2(config-if)#ppp ?
  authentication  Set PPP link authentication method
  bridge          Enable PPP bridge translation
  chap            Set CHAP authentication parameters
  compression     Enable PPP Compression control negotiation
  lcp             PPP LCP configuration
  max-bad-auth    Allow multiple authentication failures
  multilink       Make interface multilink capable
  pap             Set PAP authentication parameters
  quality         Set minimum Link Quality before link is down
  reliable-link   Use LAPB with PPP to provide a reliable link
  timeout         Set PPP timeout parameters
  use-tacacs      Use TACACS to verify PPP authentications
```

```
router2(config)#
router2(config)#int s0
router2(config-if)#
router2(config-if)#dialer ?
  callback-secure         Enable callback security
  caller                  Specify telephone number to be screened
  dtr                     Set DTR dialing for interface
  enable-timeout          Set length of time an interface stays down
                          before it is available for dialing
  fast-idle               Set idle time before disconnecting line with an
                          unusually high level of contention
  hold-queue              Configure output hold queue
  idle-timeout            Specify idle timeout before disconnecting line
  in-band                 Set v.25bis dialing for interface
  map                     Define multiple dial-on-demand numbers
  pool-member             Specify dialer pool membership
  priority                Specify priority for use in dialer group
  rotary-group            Add to a dialer rotary group
  snapshot                Specify snapshot sequence number for Dialer Profiles
  string                  Specify telephone number to be passed to DCE
                          device
  wait-for-carrier-time   How long the router will wait for carrier
  watch-disable           Time to wait before bringing down watched route
                          link
  watch-group             Assign interface to dialer-watch-list
```

```
router2(config)#
router2(config)#int s0
router2(config-if)#
router2(config-if)#dialer map ?
  bridge    Bridging
  clns      ISO CLNS
  hpr       HPR
  ip        IP
  ipx       Novell IPX
  llc2      LLC2
  netbios   NETBIOS
  snapshot  Snapshot routing support

router2(config-if)#dialer map ip ?
  A.B.C.D  Protocol specific address

router2(config-if)#dialer map ip 172.16.1.2 ?
  WORD           Dialer string
  broadcast      Broadcasts should be forwarded to this address
  class          dialer map class
  modem-script   Specify regular expression to select modem dialing
                 script
  name           Map to a host
  spc            Semi Permanent Connections
  speed          Set dialer speed
  system-script  Specify regular expression to select system dialing
                 script

router2(config-if)#dialer map ip 172.16.1.2 name ?
  WORD  Hostname to map

router2(config-if)#dialer map ip 172.16.1.2 name routerx ?
  WORD           Dialer string
  broadcast      Broadcasts should be forwarded to this address
  class          dialer map class
  modem-script   Specify regular expression to select modem dialing
                 script
  name           Map to a host
  spc            Semi Permanent Connections
  speed          Set dialer speed
  system-script  Specify regular expression to select system dialing
                 script
  <cr>

router2(config-if)#dialer map ip 172.16.1.2 name routerx 5551212
  <cr>
```

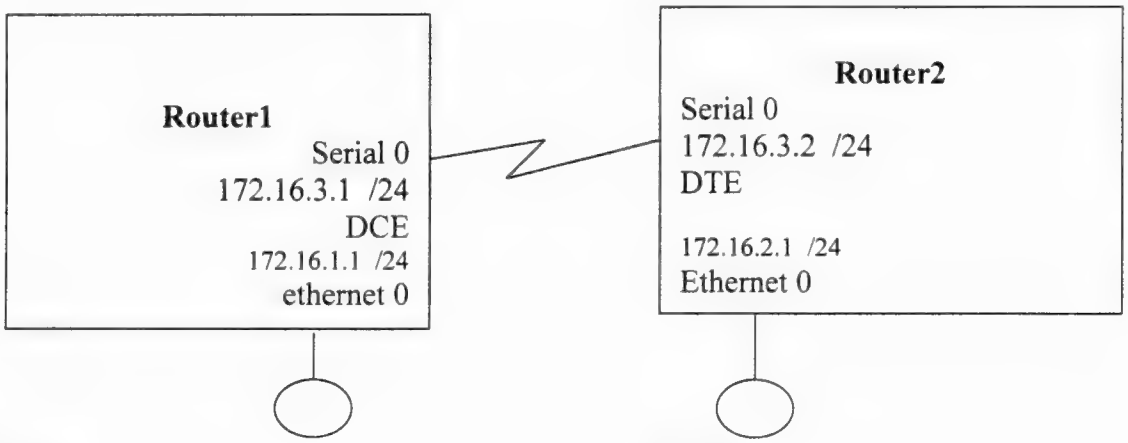
you can ~~have~~ multiple virtual dialer interface.

didn't apply to
interface directly ←

DDR using Dialer Profiles

define common properties

Using dialer profiles you create a virtual dialer interface which can then be applied to one or more physical interfaces Router1 will be configured using dialer profiles to call router2. There are 4 basic steps to complete: 1) Specify interesting traffic. 2) Configure the dialer interface.-router1 only. 3) Configure the physical interface. 4) Create static routes and configure chap usernames and passwords




```
Config t
Hostname router1
Ip routing
Int ethernet 0
Ip address 172.16.1.1 255.255.255.0
No shutdown

Dialer-list 5 protocol ip permit

Interface dialer 1
Ip address 172.16.3.1 255.255.255.0
Encapsulation ppp
Ppp authentication chap
Dialer remote-name router2
Dialer idle-timeout 60
Dialer string 5551212
Dialer fast-idle 1
Dialer pool 10
Pulse-time 1
Dialer-group 5
No shutdown

Interface serial 0
No ip address
Clock rate 56000
Dialer in-band
Encapsulation ppp (don't need this - because
Dialer pool-member 10
No shutdown
Exit
Username router2 password 12345

Ip route 172.16.2.0 255.255.255.0 172.16.3.2
```

virtual Dialer

of virtual interface apply to physical int S0

```
Config t
hostname router2
ip routing
int ethernet 0
ip address 172.16.2.1 255.255.255.0
no shutdown

interface serial 0
ip address 172.16.3.2 255.255.255.0
encapsulation ppp
ppp authentication chap
dialer in-band
pulse-time 1
dialer map ip 172.16.3.1 name router1
no shutdown
exit

username router1 password 12345
ip route 0.0.0.0 0.0.0.0 serial 0
```

```
router1#show run
Building configuration...

Current configuration:
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname router1
!
enable secret 5 $1$WTBN$pDTcPKjxwVQbVwJtvzd/0/
enable password 12345
!
username router2 password 0 12345
ip subnet-zero
!
!
!
interface Ethernet0
 ip address 172.16.1.1 255.255.255.0
 no ip directed-broadcast
!
interface Serial0
 no ip address
 no ip directed-broadcast
 encapsulation ppp
 dialer in-band
 dialer pool-member 10
 no fair-queue
 clockrate 56000
 pulse-time 1
!
interface Dialer1
 ip address 172.16.3.1 255.255.255.0
 no ip directed-broadcast
 encapsulation ppp
 dialer remote-name router2
 dialer idle-timeout 60
 dialer fast-idle 1
 dialer string 5551212
 dialer pool 10
 dialer-group 5
 ppp authentication chap
!
ip classless
ip route 172.16.2.0 255.255.255.0 172.16.3.2
!
dialer-list 5 protocol ip permit
!
line con 0
 transport input none
line 1
line vty 0 4
 password 12345
router1#
router1#show dialer

Dialer1 - dialer type = DIALER PROFILE
```

```
Idle timer (60 secs), Fast idle timer (1 secs)
Wait for carrier (30 secs), Re-enable (15 secs)
Dialer state is data link layer up

Dial String      Successes   Failures    Last called   Last status
5551212                  0          0    never                    -   Default

Serial0 - dialer type = IN-BAND SYNC NO-PARITY
Dialer pool 10, priority 0
Idle timer (60 secs), Fast idle timer (1 secs)
Wait for carrier (30 secs), Re-enable (15 secs)
Dialer state is data link layer up
Interface bound to profile Dialer1
Time until disconnect 2 secs
Current call connected never
Connected to 5551212 (5551212)
router1#
router1#
router1#show interface dialer 1
Dialer1 is up (spoofing), line protocol is up (spoofing)
  Hardware is Unknown
  Internet address is 172.16.3.1/24
  MTU 1500 bytes, BW 56 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation PPP, loopback not set
  DTR is pulsed for 1 seconds on reset
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
     Conversations  0/0/256 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     84 packets input, 2664 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     84 packets output, 2664 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
router1#
```

```
router1#show interface serial 0
Serial0 is up, line protocol is up
  Hardware is QUICC Serial
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation PPP, loopback not set, keepalive set (10 sec)
  DTR is pulsed for 1 seconds on reset
  Time to interface disconnect:  idle 00:00:31
  LCP Open
  Listen: CDPCP
  Open: IPCP
  Last input 00:00:06, output 00:00:06, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     395 packets input, 7568 bytes, 0 no buffer
     Received 395 broadcasts, 0 runts, 0 giants, 0 throttles
     3 input errors, 0 CRC, 3 frame, 0 overrun, 0 ignored, 0 abort
     393 packets output, 7584 bytes, 0 underruns
     0 output errors, 0 collisions, 29 interface resets
     0 output buffer failures, 0 output buffers swapped out
     9 carrier transitions
     DCD=up  DSR=up  DTR=up  RTS=up  CTS=up

router1#
router1#
00:30:41: Serial0: idle timeout
00:30:41: Se0: has total 1 call(s), dial_out 0, dial_in 0
00:30:41: %DIALER-6-UNBIND: Interface Serial0 unbound from profile Dialer1
00:30:41: Serial0: disconnecting call
router1#
router1#ping 172.16.2.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.2.1, timeout is 2 seconds:

00:31:22: Di1: No free dialer - starting fast idle timer.
00:31:24: Di1: No free dialer - starting fast idle timer.
00:31:26: Di1: No free dialer - starting fast idle timer.
00:31:28: Di1: No free dialer - starting fast idle timer.
00:31:30: Di1: No free dialer - starting fast idle timer.
Success rate is 0 percent (0/5)
router1#
```

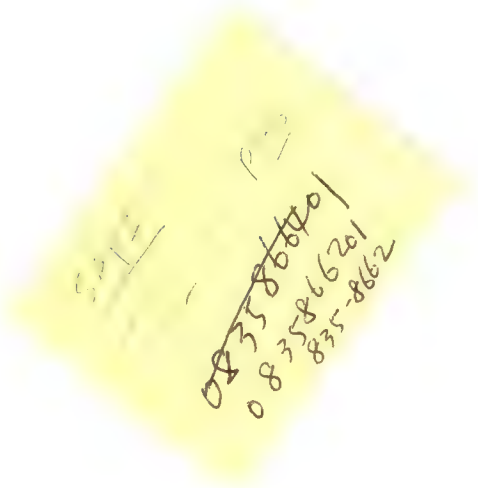
```
router1#config t
Enter configuration commands, one per line.  End with CNTL/Z.
router1(config)#int s0
router1(config-if)#
router1(config-if)#shutdown
00:31:40: Serial0: disconnecting calls
00:31:42: %LINK-5-CHANGED: Interface Serial0, changed state to administratively down
00:31:43: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed state to
down
router1(config-if)#
router1(config-if)#no shut
router1(config-if)#^Z
router1#
00:31:57: %SYS-5-CONFIG_I: Configured from console by console
00:31:58: %LINK-3-UPDOWN: Interface Serial0, changed state to up
00:31:59: %DIALER-6-BIND: Interface Serial0 bound to profile Dialer1
00:31:59: Se0 PPP: Treating connection as a callin
00:32:01: Se0 PPP: Phase is AUTHENTICATING, by the peer
00:32:01: Se0 CHAP: I CHALLENGE id 1 len 16 from "router2"
00:32:01: Se0 CHAP: O RESPONSE id 1 len 28 from "router1"
00:32:01: Se0 CHAP: I SUCCESS id 1 len 4
00:32:01: dialer Protocol up for Se0
00:32:02: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed state to
up
router1#
router1#ping 172.16.2.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.2.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 36/39/40 ms
router1#
router1#
00:29:37: Serial0: idle timeout
00:29:37: Se0: has total 1 call(s), dial_out 0, dial_in 0
00:29:37: %DIALER-6-UNBIND: Interface Serial0 unbound from profile Dialer1
00:29:37: Serial0: disconnecting call
00:29:39: %LINK-3-UPDOWN: Interface Serial0, changed state to down
00:29:40: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed state to
down
00:29:41: %LINK-3-UPDOWN: Interface Serial0, changed state to up
00:29:41: %DIALER-6-BIND: Interface Serial0 bound to profile Dialer1
00:29:41: Se0 PPP: Treating connection as a callin
00:29:43: Se0 PPP: Phase is AUTHENTICATING, by the peer
00:29:43: Se0 CHAP: I CHALLENGE id 1 len 16 from "router2"
00:29:43: Se0 CHAP: O RESPONSE id 1 len 28 from "router1"
00:29:43: Se0 CHAP: I SUCCESS id 1 len 4
00:29:43: dialer Protocol up for Se0
00:29:44: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed state to
up
```

PPP commands

```
router2#config t
Enter configuration commands, one per line.  End with CNTL/Z.
router2(config)#int serial 0
router2(config-if)#
router2(config-if)#encapsulation ?
  atm-dxi      ATM-DXI encapsulation
  frame-relay  Frame Relay networks
  hdlc         Serial HDLC synchronous
  lapb         LAPB (X.25 Level 2)
  ppp          Point-to-Point protocol
  smds         Switched Megabit Data Service (SMDS)
  x25          X.25

router2(config-if)#encapsulation ppp
router2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed state to down
router2(config-if)#
router2(config-if)#ppp ?
  max-bad-auth
  authentication       Set PPP link Authentication method
  bridge               Enable ppp bridge translation
  chap                 Set CHAP authentication parameters
  compression          Enable PPP Compression control negotiation
  multilink            Make interface multilink capable
  negotiation-timeout  Negotiation timeout period
  pap                  Set PAP authentication parameters
  reliable-link        Use LAPB with PPP to provide a reliable link
  use-tacacs           Use TACACS to verify PPP Authentications

router2(config-if)#ppp authentication ?
  chap  Challenge Handshake Access Protocol (CHAP)
  pap   Password Authentication Protocol (PAP)

router2(config-if)#ppp authentication chap
router2(config-if)#
router2(config-if)#ppp multilink
router2(config-if)#
router2(config-if)#ppp compression ?
  predictor  Predictor Compression
  stacker    Stacker (LZS) Compression
router2(config-if)#ppp compression stacker
router2(config-if)#
router2(config-if)#^Z
```

Cisco Proiary

```
router2#
router2#show run
Building configuration...

Current configuration:
!
version 11.2
no service udp-small-servers
no service tcp-small-servers
!
hostname router2
!
enable secret 5 $1$MibE$cv2KLw/1kl8rmHtS6MBwe/
enable password 12345
!
!
interface Loopback0
 ip address 172.16.4.1 255.255.255.0
!
interface Loopback1
 ip address 172.16.5.1 255.255.255.0
!
interface Ethernet0
 no ip address
 shutdown
!
interface Serial0
 ip address 172.16.3.2 255.255.255.0
 no ip mroute-cache
 encapsulation ppp
 no fair-queue
 compress stac
 ppp authentication chap
 ppp multilink
!
router eigrp 20
 network 172.16.0.0
!
no ip classless
!
line con 0
line vty 0 4
 password 12345
 login
!
end

router2#
router2#
```



Backup delay 5 30

— backup after 5 second delay when primary is down

— Disconnect backup after 30 second when Primary is up again

Backup load 80 20

— when primary have 80% BW, then connect the backup link

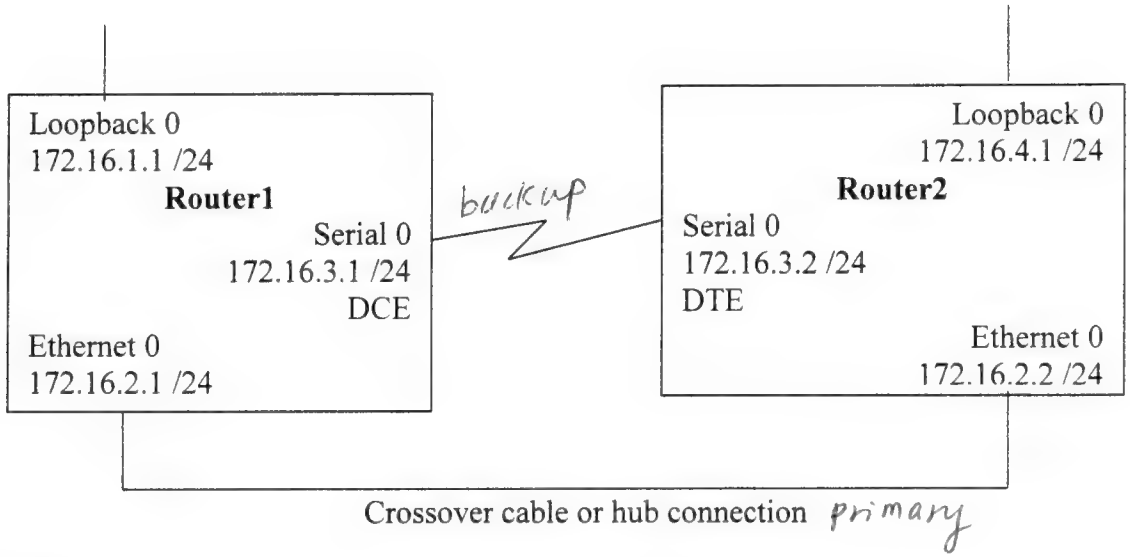
— when primary low 20%. then disconnect the secondary

(40)

$>55 \times 5\frac{20}{100} = 51$

Dial backup configuration

This exercise will simulate a dial backup scenario. Ethernet 0 will be the primary link between router1 and router2, and serial 0 will simulate a dial ***backup link.***



Config t	Config t
Hostname router1	hostname router2
Ip routing	ip routing
Int loopback0	int loopback0
Ip address 172.16.1.1 255.255.255.0	ip address 172.16.4.1 255.255.255.0
Int serial0	int serial0
Ip address 172.16.3.1 255.255.255.0	ip address 172.16.3.2 255.255.255.0
No shutdown	no shutdown
Clock rate 56000	
Int ethernet 0	int ethernet 0
Ip address 172.16.2.1 255.255.255.0	ip address 172.16.2.2 255.255.255.0
No shutdown	no shutown
Backup interface serial 0	backup interface serial 0
Backup delay 5 30 Link goes down 5 seconds.	backup delay 5 30
Backup load 80 20 trigger another link	backup load 80 20
Router rip	router rip
Network 172.16.1.0	network 172.16.2.0
Network 172.16.2.0	network 172.16.3.0
Network 172.16.3.0	network 172.16.4.0

```
router1#
router1#config t
Enter configuration commands, one per line.  End with CNTL/Z.
router1(config)#
router1(config)#interface e0
```

```
router1(config-if)#
router1(config-if)#backup ?
  delay      Delays before backup line up or down transitions
  interface  Configure an interface as a backup
  load       Load thresholds for line up or down transitions

router1(config-if)#backup interface serial 0
router1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed state to down
%LINK-5-CHANGED: Interface Serial0, changed state to standby mode
router1(config-if)#
router1(config-if)#backup delay ?
  <0-4294967294>  Seconds
  never           Never activate the backup line

router1(config-if)#backup delay 5 ?
  <0-4294967294>  Seconds
  never           Never deactivate the backup line

router1(config-if)#backup delay 5 30
router1(config-if)#
router1(config-if)#backup load ?
  <0-100>  Percentage
  never    Never activate the backup line

router1(config-if)#backup load 80 ?
  <0-100>  Percentage
  never    Never deactivate the backup line

router1(config-if)#backup load 80 20
router1(config-if)#
router1(config-if)#^Z
router1#
%SYS-5-CONFIG_I: Configured from console by console
router1#
```

```
router1#show run
Building configuration...

Current configuration:
!
version 11.0
service udp-small-servers
service tcp-small-servers
!
hostname router1
!
enable secret 5 $1$L995$GRI96xTjhTQFEKMeER83i1
enable password 12345
!
!
interface Loopback0
 ip address 172.16.1.1 255.255.255.0
!
interface Ethernet0
 backup delay 5 30
 backup interface Serial0
 backup load 80 20
 ip address 172.16.2.1 255.255.255.0
!
interface Ethernet1
 no ip address
 shutdown
!
interface Serial0
 ip address 172.16.3.1 255.255.255.0
 no fair-queue
 clockrate 56000
!
interface Serial1
 no ip address
 shutdown
!
router rip
 network 172.16.0.0
!
!
line con 0
line aux 0
 transport input all
line vty 0 4
 password 12345
 login
!
end

router1#
```

```
router1#show interface e0
Ethernet0 is up, line protocol is up
  Hardware is Lance, address is 0010.7b3b.f8c0 (bia 0010.7b3b.f8c0)
  Internet address is 172.16.2.1 255.255.255.0
  Backup interface Serial0, kickin load 80%, kickout load 20%
      failure delay 5 sec, secondary disable delay 30 sec
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 4:00:00
  Last input 0:00:07, output 0:00:04, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     108 packets input, 21726 bytes, 0 no buffer
     Received 105 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 input packets with dribble condition detected
     211 packets output, 26576 bytes, 0 underruns
     6 output errors, 0 collisions, 1 interface resets, 0 restarts
     0 output buffer failures, 0 output buffers swapped out
router1#
router1#show interface s0
Serial0 is standby mode, line protocol is down
  Hardware is HD64570
  Internet address is 172.16.3.1 255.255.255.0
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation HDLC, loopback not set, keepalive set (10 sec)
  Last input 0:01:22, output 0:01:17, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     84 packets input, 7144 bytes, 0 no buffer
     Received 76 broadcasts, 0 runts, 0 giants
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     120 packets output, 10489 bytes, 0 underruns
     0 output errors, 0 collisions, 27 interface resets, 0 restarts
     0 output buffer failures, 0 output buffers swapped out
     22 carrier transitions
     DCD=down  DSR=down  DTR=up  RTS=up  CTS=down
router1#
```

```
router1#traceroute 172.16.4.1

Type escape sequence to abort.
Tracing the route to 172.16.4.1

  1 172.16.2.2 8 msec 8 msec *  (notice here the ethernet link was used)
router1#
```

Now unplug the ethernet cable from router1 to router2 to simulate a link failure

backup link

```
router1#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0, changed state to down
%LINK-3-UPDOWN: Interface Serial0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed state to up
router1#
router1#traceroute 172.16.4.1

Type escape sequence to abort.
Tracing the route to 172.16.4.1

1 172.16.3.2 40 msec 24 msec *  (notice that now the serial link is used )
router1#
```

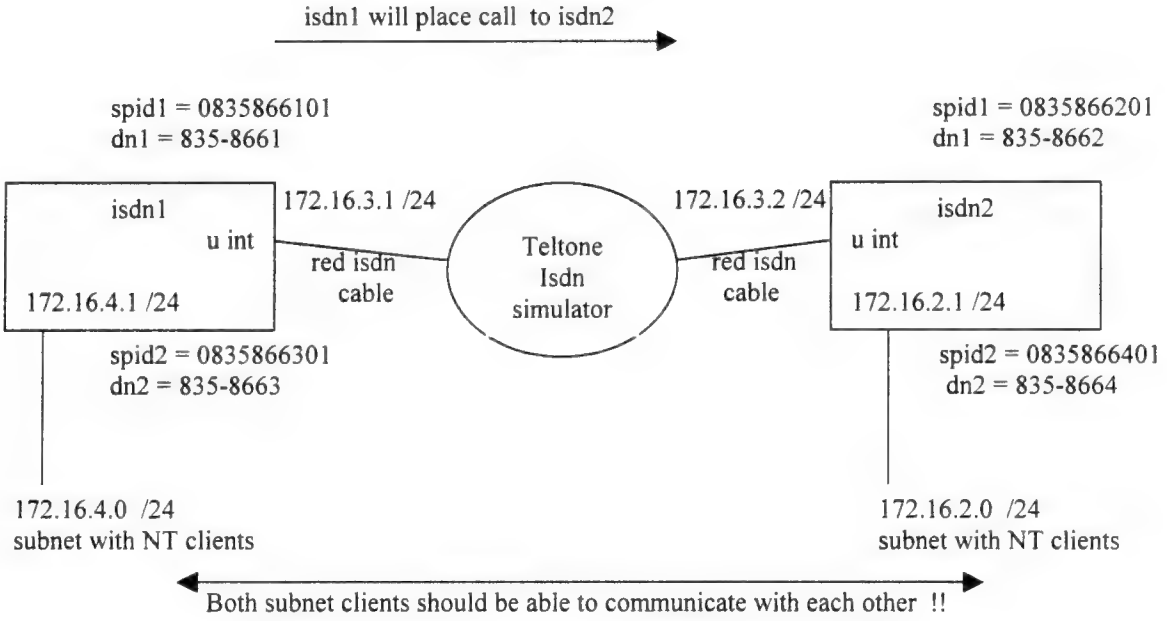
Now plug the ethernet cable back in !!

```
router1#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed state to down
%LINK-5-CHANGED: Interface Serial0, changed state to standby mode
router1#
router1#traceroute 172.16.4.1
```

+ delay 30 seconds

```
Type escape sequence to abort.
Tracing the route to 172.16.4.1

  1 172.16.2.2 196 msec 8 msec *  (once again the ethernet route is used)
```

Cisco 700 series ISDN router configuration exercise



There are 3 basic steps to configure a Cisco 700 series router :

1) Configure the **system mode parameters** such as the system name, switch type, spid's, directory numbers, and the type of PPP authentication and passwords.
2) Configure the **LAN profile parameters** such as the LAN ip address and subnet mask, and whether to use bridging or ip routing.
3) Create a **user profile** using the **name of the remote router**. **Configure the new user profile parameters** such as WAN ip address and subnet mask, whether to use bridging or ip routing, the numbers to dial for this connection, and a static default route to the remote location. Before you can use this new user profile, you must also set it to be active !!!

Isdn1 router configuration	**Isdn2 router configuration**
System mode	*System mode*
Set defaults	Set defaults
Set systemname isdn1	Set systemname isdn2
Set ppp authentication outgoing chap	Set ppp authentication incoming chap
Set ppp secret client 12345	Set ppp secret host 12345
Set switch NI-1	Set switch NI-1
Set 1 spid 0835866101	Set 1 spid 0835866201
Set 2 spid 0835866301	Set 2 spid 0835866401
Set 1 directorynumber 835-8661	Set 1 directorynumber 835-8662
Set 2 directorynumber 835-8663	Set 2 directorynumber 835-8664
LAN profile configuration mode	*LAN profile configuration mode*
Cd lan	Cd lan
Set bridging off	Set bridging off
Set ip routing on	Set ip routing on
Set ip address 172.16.4.1	Set ip address 172.16.2.1
Set ip netmask 255.255.255.0	Set ip netmask 255.255.255.0
User profile configuration mode	User profile configuration mode
Set user isdn2	Set user isdn1
Set bridging off	Set bridging off
Set ip routing on	Set ip routing on
Set ip address 172.16.3.1	Set ip address 172.16.3.2
Set ip netmask 255.255.255.0	Set ip netmask 255.255.255.0
Set 1 number 8358662	Set 1 number 8358661
Set 2 number 8358664	Set 2 number 8358662
Set active	Set active
Set ip route dest 0.0.0.0/0 gateway 172.16.3.2 propagate on cost 1	Set ip route dest 0.0.0.0/0 gateway 172.16.3.1 propagate on cost 1

2 command

0.0.0.0 0.0.0.0

Cisco 700 series router configuration

To get help on the CLI, type **?**

```
> ?
CAll [ C# | L# | # | C#/L# | C#/# | #/# ]  [ P# | CH# | P#/CH# ] [<number>]
where
 C#            indicates a Connection number
 # or L#       indicates a Link number or D in case of the D channel ink
C#/L# or #/#  indicates Link of a Connection. Link should be D for D channel link
 P#            indicates Port
 CH#           indicates Channel
 P#/CH#        indicates Channel of a Port
CD [<username>]
DEmand [<link>] [THreshold=kb/s] [DUration=<seconds>] [SOurce= WAN | LAn | BOth]
DIsconnect [ C# | L# | # | C#/L# | C#/# #/# | P# | CH# | P#/CH# | ALl ]
where
 C#            indicates a Connection number
 # or L#       indicates a Link number or D in case of the D channel link
 C#/L# or #/#  indicates Link of a Connection. Link should be D for D channel link
 P#            indicates Port
 CH#           indicates Channel
 P#/CH#        indicates Channel of a Port
EStablish [<spid id>]
HElp [<cmd> [<modifier>]]
IPxPIng ADdress <net:node> | SErver <server_name>
LOg
LOg NOne | CAlls | MEssage | ERrors | IPx [ TIme ] [ VErbose ]
LOg [ LAN | <connection> ] PAckets | TRaffic [CHannel = <channel>] [ VErbose [
INbound | OUtbound ] ]
LOGIn <ipaddress> | <ethernetaddress> | <connectionid> | REmote
LOGOut
PIng <ip address>
REBoot
RELease [<spid id>]
REset ADdress = <address> | ALl
REset CALLIdreceive <number> | ALl
REset DIrectorynumber = <number>[<.subaddress>] | ALl
REset DHcp ADdress <ip address> | ALl
REset [<id>] FIlter = [ALl]
REset IP PAt POrthandler <port_number> | ALl
REset IP FIlter <filter ID> | ALl
REset IP ROute ALl
REset IP ROute DEstination <network>[/ <bits>] [GAteway <next hop>]
REset IPX FIlter <filter id> | ALl
REset IPX GAteway
REset IPX ROute ALl | DEstination=<netnum> GAteway=<net:node>
REset IPX SAp HElper
REset IPX SErvice ALl | NAme=<service-name> TYpe=<service-type>
REset [ <connection> | LAN ] PACkets [ ALl]
REset [<patternname>] PATtern = [ALl]
REset PHONE1 | PHONE2 | DOV
REset SNmp TRaphost <ip address> | ALl
REset TYpe = <type> | ALl
REset USer < Username >
REset X25D POlicy [LSvc <1-4>] | ALl
SEt ACtive [<username>]
SEt ADdress = <address>
SEt AGe = <seconds> | OFf
SEt ALawvoice ON | OFf
```

```
SEt AOcdtimeout ON [<seconds>] | OFf
SEt AODi ON NUA=<nua> [ POwerupenable ] [ REversechargerequest ON | OFf ]
SEt AODi OFf
SHow AODi
SEt AUTODetection ON | OFF
SEt [<link>] AUto = ON | OFf
SEt [<link>] BAckupnumber = [<number> <.subaddress>]
SEt BAudrate 300 | 1200 | 2400 | 4800 | 9600 | 19200 | 38400
SEt BRidging ON | OFf
SEt BIlling SPc <number> | TImelink | NOne
SEt BUtton STandard | <username> | OFf
SEt CALLDuration <minutes from 1 to 1430>
SEt CALLErid ON | OFf
SEt CALLIdreceive <number>
SEt CALLTime [VOice | DAta] INcoming | OUTgoing
          <starttime in HH:MM> <endtime in HH:MM>
SEt CALLTime [VOice | DAta] INcoming | OUTgoing OFf
SEt CALLWaiting [ INterface = PHONE1 | PHONE2 ] ON | OFf
SEt CLIAuthentication OFf | ON [MInimummatch]
SEt CLICallback OFf | ON [<# of digits to match>] [DElay <seconds>]
SEt [<link>] CLIValidatenumber = [<number> <.subaddress>]
SEt COmpression STac | OFf
SEt CONference <feature access code>
SEt COUntrygroup <group number>
SEt DAte MM/DD/YYYY
SEt DEfaults
SEt [<link>] DELay = <seconds>
SEt DHcp ADdress <start ip_address> <count>
SEt DHcp DNs PRimary | SEcondary <server_address>
SEt DHcp DOmain [domain_name]
SEt DHcp GAteway PRimary | SEcondary <ip_address>
SEt DHcp LEasetime <minutes from 60 to 71000>
SEt DHcp NEtmask <netmask>
SEt DHcp NETBIOS_Scope [scope_id]
SEt DHcp SErver | RElay <ip address> | OFf
SEt DHcp WIns PRimary | SEcondary <server_address>
SEt [<spid id>] DIrectorynumber = <number> [<.subaddress>]
SEt ECho ON | OFf
SEt <id> FIlter [<patternname>]^8 [BLock | ACcept ] | [IGnore | DEmand ]
SEt GAteway <ip address>
SEt INactive [<username>]
SEt INTernaltones NOne | DIaltone | ALl
SEt IP <ip address>
SEt IP ADdress <ip address>
SEt IP COst <value>
SEt IP FIlter <[type] IN | OUt [SOurce = [NOT]<address>]
                              [DEstination = [NOT]<address>]> |
             < IN | OUt <patternname>^8 > < BLock | ACcept | DEMand | IGnore >
SEt IP FRaming EThernet_II | NOne
SEt IP MUlticast ON | OFf
SEt IP PAt ON | OFf
SEt IP PAt POrthandler DEfault | TElnet | WIns | HTtp | SMtp |
                       FTp | <port_number> <ip address> | OFf
SEt IP PAt TCptimeout <minutes>
SEt IP PAt UDptimeout <minutes>
SEt IP NEtmask <mask>
SEt IP PRopagate ON | OFf
SEt IP RIp REceive BOth | V1 | V2 | Off
SEt IP RIp SNapshot CLient ACtive <time> QUiet <time> UPdate OFf | ON
SEt IP RIp SNapshot SErver ACtive <time> UPdate OFf | ON
SEt IP RIp SUmmarization AUto | OFf
```

```
SEt IP RIp TIme <value>
SEt IP RIp UPdate PEriodic | LInkup | DEmand | SNapshot | TRiggered | OFf
SEt IP RIp VErsion 1 | 2 | BOTH
SEt IP ROUTE DEstination <network>[/<bits>] GAteway <nexthop>
     [ PRopagate ON | OFf ] [ COst <value>]
SEt IP ROUTIng ON | OFf
SEt IPX FIlter <SAp> <INput> [TYpe = <type>] [SOcket = <socket>]
                             [ NAme = <servname> ] ACcept | BLock
SEt IPX FIlter <SAp> <INput> [TYpe = <type>] [SOcket = <socket>]
                             [ NAme = <servname> ] ACcept | BLock
SEt IPX FRaming EThernet_II | 802.3 | 802.2 | SNap | NOne | UNKnown
SEt IPX GAteway <net:node> USer <username>
SEt IPX NETBios ACcept | BLock
SEt IPX NETWorkaddress <network number>
SEt IPX RIp REceive OFf | ON
SEt IPX RIp SNapshot CLient ACtive <time> QUiet <time> UPdate OFf | ON
SEt IPX RIp SNapshot SErver ACtive <time> UPdate OFf | ON
SEt IPX RIp UPdate = PEriodic | DEmand | SNapshot | OFf
SEt IPX ROUTE DEstination=<netnum> GAteway=<net:node>
                [HOps=<hops>] [COst=<ticks>]
SEt IPX ROUTIng ON | OFf
SEt IPX SAp HElper <net:node>
SEt IPX SErvice NAme=<service-name> TYpe=<service-type>
               ADdress=<net:node:sock> [HOps=<hops>]
SEt IPX SPoofing <minutes> | OFf
SEt IPX TRace <length> | OFf | ON
SEt LEarn ON | OFf
SEt LOcalaccess ON | PArtial | PRotected
SEt LOGout <time>
SEt [ <connection> ] LOOpback ON | OFf
SEt [ WAN | LAn ] MOde = ANy | ONly
SEt MUltidestination ON|OFF
SEt NETBios NAme SPoofing <minutes> | OFf
SEt NETBios FIlter ON | OFf
SEt [<link>] NUmber = [<number> <.subaddress>]
SEt PASSThru ON | OFf
SEt PAssword SYstem [ENcrypted] [<password>]
SEt <patternname> [PAttern = < hexpattern > <binarypattern> <decimalpattern>]
    [OFfset = <number>]
    [FRom = BEGINNING | TYPEFIELD | IPHDR | TCPHDR | UDPHDR | TCPDATA | UDPDATA]
    [PATTERNName = <patternname>]
SEt [<link>] PErmanent ON | OFf
SEt PHONE1 | PHONE2 | DOV <number> [<.subaddress>] [<RING1|RING2|RING3>]
SEt PLan NOrmal | INternational | NAtional | SUbscriber |
        UNknown_isdn | ABbreviated | CEntrex | NEtwork
SEt PPp ADdress NEgotiation LOcal ON | OFF
SEt PPp AUthentication INcoming [ CHap ] [ PAp ] [ NOne ]
SEt PPp AUthentication OUtgoing [ CHap ] [ PAp ] [ NOne ]
SEt PPp AUthentication ACcept   <[ CHap | PAp ]|[ EIther ]>
SEt PPp BAcp ON | OFf
SEt PPp CAllback REQuest | REPly ON | OFf | ALways
SEt PPp CHAPAllow MUltihost ON | Off
SEt PPp CHaprefuse ALl | NOne | [INcall][REsponsefirst][SAmehost][DIrectionwrong]
SEt PPp CLientname [ <Clientname> ]
SEt PPp IP NEtmask LOcal ON | OFf
SEt PPp MAgicnumbercheck ON | OFf
SEt PPp MUltilink ON | OFf
SEt PPp MUltilink PPpheader ON | OFf
SEt PPp NEgotiation COunt <attempts>
SEt PPp NEgotiation INtegrity <seconds> | OFf
SEt PPp NEgotiation REtry <milliseconds>
```

```
SEt PPp <PAssword | SEcret> <HOst | CLient> {ENcrypted] [<password>]
SEt PPp TAS CEntral | DIstributed | OFf
SEt PPp TAS CLient <ip address>
SEt PPp TAS CHapsecret LOcal ON | OFf
SEt PPp TErmreq COunt <attempt>
SEt PROFile [POwerup=ACtivate|INactive] [DIsconnect=DEactivate|KEep]
            [USer=<new profile name>]
SEt PROFile ID <ethernet address>
SEt REmoteaccess OFF | PArtial | PRotected
SEt [<spid id>] RIngback [<number>]
SEt SCreenlength <lines>
SEt SErialPort COnfig | TPAD
SEt X25D LSvc <1-4> NUA <nua> [NUI <nui>] IDle <idle time>
SEt X25D POlicy LSvc <1-4> HOst <ip address> TCP|UDP|ICMP [POrt xxxx]
[REversechargerequest ON | OFF]
SEt X25D TEI <value>| ON | OFF
SEt X25D PRiorityqueue LSvc <1-4> IP <HIgh|MEdium|NOrmal|LOw>[<TCP|UDP|ICMP|ALL [POrt
xxxx]>]|[<PKtsize Greater|LEssthan <xxx>>]
SEt X25D PRiorityqueue LSvc <1-4> DEfault HIgh|MEdium|NOrmal|LOw
SEt X25D PRiorityqueue LSvc <1-4> LImit HIgh|MEdium|NOrmal|LOw <xx>
SEt X25D X121Host <X121 address>
SEt X25D POlicy LSvc <1-4> HOst <ip address> TCP|UDP|ICMP [POrt xxxx]
[REversechargerequest ON | OFF]
SEt X25D TEI <value>| ON | OFF
SEt X25D PRiorityqueue LSvc <1-4> IP <HIgh|MEdium|NOrmal|LOw>[<TCP|UDP|ICMP|ALL [POrt
xxxx]>]|[<PKtsize Greater|LEssthan <xxx>>]
SEt X25D PRiorityqueue LSvc <1-4> DEfault HIgh|MEdium|NOrmal|LOw
SEt X25D PRiorityqueue LSvc <1-4> LImit HIgh|MEdium|NOrmal|LOw <xx>
SEt X25D X121Host <X121 address>
SEt SNmp COntact " contact string "
SEt SNmp LOcation " location string "
SEt SNmp TRap [ COldstart = ON | OFf ] [ WArmstart = ON | OFf ]
 [ LInkup = ON | OFf ] [ LINKDown = ON | OFf ] [ AUthenticationfail = ON | OFf ]
SEt SNmp TRAPHost <ip address>
SEt SPeed 56k | 64k | AUto | VOice
SEt [<spid id>] SPId = [<SPID number>]
SEt SUbnet <ip address mask>
SEt SWitch 5ESS | DMS | NI-1 | PERM64 | PERM128 | PERM2X64
SEt SYstemname [ <Systemname > ]
SEt TIme  HH:MM:SS
SEt <link> TIMEOut [<seconds> | OFf
SEt TYpe = <type> [ ACcept | BLock ] [ IGnore | DEmand ]
SEt TRansfer <feature access code>
SEt TPad PArity EVen | ODd | NOne | Mask
SEt UNicastfilter ON|OFF
SEt USer [<username>] [ INcoming | OUtgoing ]
SEt VOicepriority [ INcoming | OUtgoing ] [ INTerface = PHONE1 | PHONE2 ]
                  NEver | COnditional | ALways
SEt X25 [LIc | HIc | LTc | HTc | LOc | HOc] <vc_number>
SHow
SHow [<connection>] ADdress
SHow CALLDuration
SHow CALLTime
SHow COnfig | NEgotiation | SEcurity [ALl]
SHow CONNections | DEmand | ETher | VOicerouting | STatus | TImeout
SHow DHcp Config
SHow [ <id> ] FIlter
SHow IP COnfig | FIlter | ROute [ALl]
SHow IP PAt
SHow IP RIp SNapshot [ALl]
SHow IP RIp TIme
```

```
SHow IPX COnfig | ROute | SErvice [ALl]
SHow IPX CONNections| DEmand | STatistics
SHow IPX FIlter [ALl]
SHow IPX RIp SNapshot [ALl]
SHow MEmstats | SNmp | TYpe
SHow NETBios NAme
SHow [ <connection> | LAn ] PAckets
SHow [ <patternname> ] PATtern
SHow PRofile | USers
SHow TPad
SHow X25
SHow X25D POlicy
SHow X25D STatistics
SHow X25D TEI
SHow X25D PRiorityqueue COnfig
SHow X25D X121HOST
SHow X25D POlicy
SHow X25D STatistics
SHow X25D TEI
SHow X25D X121HOST
SHow X25D PRiorityqueue COnfig
SWl
SWl TFTP
SWl TFTP COnfig
SWl TFTP <ip address> <file name>
SWl TFTP COnfig <ip address> <file name>
TEst  [ STop | REsult | ETher ]
TEst [ <connection> ] [ WAn | ALl ]
TEst MAxpkts <bytes>
TEst MInpkts <bytes>
TEst RAte <pps>
TEst POts <1/2> RIng [cadence]
TImeout <link> [THreshold=<kbs>] [DUration=<seconds>] [SOurce= WAn | LAn | Both]
UNlearn [<connection>]
UNset [<link>] AUto
UNset CALLErid | COmpression
UNset [<link>] DEmand | TIMEOut
UNset LEarn | PASSThru | SPeed | BRidging
UNset [<link>] NUmber | Ringback
UNset [<link>] PErmanent
UNset PPp AUthentication
UNset PPp CAllback
UNset PPp PAssword HOst
UNset PPp SEcret HOst
UPload
UPload TFTP <ip address> <file name>
VErsion
>
>
```

```
isdn1> reboot
Boot version 2.1(2) 11/07/97 16:06
Copyright (c) 1993-1997.  All rights reserved.
POST ............ OK (1.5MB).
Validating FLASH ... OK.
Waiting ...
Booting up ..............................
01/01/1995 00:00:00  Connection 1 Opened
isdn1> 01/01/1995 00:00:00  L01  0               Started Operation
isdn1> 01/01/1995 00:00:00  Connection 2 Opened
isdn1> 01/01/1995 00:00:01  L02  0               Line Activated
isdn1>
Please wait for TWAIT timer to expire in 121 seconds
Make a call to bypass this timer
01/01/1995 00:02:02  L18  1               Terminal Identifier Assigned
isdn1> 01/01/1995 00:02:02  L22  1   0835866101  Sending SPID
isdn1> 01/01/1995 00:02:02  L18  2               Terminal Identifier Assigned
isdn1> 01/01/1995 00:02:02  L23  1   0835866101  SPID Accepted
isdn1> 01/01/1995 00:02:02  L22  2   0835866301  Sending SPID
isdn1> 01/01/1995 00:02:02  L23  2   0835866301  SPID Accepted


isdn1>version
Software Version c760-i.bxd.US 4.4(2) - Mar  3 2000 15:11:49
Cisco 776
ISDN Stack Revision US 2.10 (5ESS/DMS/NI-1)
Copyright (c) 1993-2000 by Cisco Systems, Inc.  All rights reserved.
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terms of the software license.
Hardware Configuration:
   DRAM:  1.5MB
   Flash: 1.0MB
   POTS:  Type 0 (Rev. 73-1797-05-C0)
   NT1:   Installed
   ROM:   2.1(2)
isdn1>
isdn1>
```

To reset the Cisco 700 series router to factory defaults and erase any previous configurations :

```
>set defaults
```

ISDN1 router configuration:

```
> set systemname isdn1
isdn1> set ppp authentication outgoing chap
isdn1> set ppp secret client 12345
isdn1> set switch NI-1
isdn1>
Please wait for TWAIT timer to expire in 31 seconds
Make a call to bypass this timer
isdn1> 01/01/1995 00:19:07  L18  1              Terminal Identifier Assigned
isdn1>
isdn1> set 1 spid 0835866101
You may reboot system to register the new SPID at any time.
isdn1> set 2 spid 0835866301
You may reboot system to register the new SPID at any time.
isdn1>
isdn1> set 1 directorynumber 835-8661
isdn1> set 2 directorynumber 835-8663
isdn1>
isdn1> cd lan
isdn1:LAN>
isdn1:LAN> set bridging off
isdn1:LAN> set ip routing on
isdn1:LAN> set ip address 172.16.4.1
isdn1:LAN> set ip netmask 255.255.255.0
isdn1:LAN>
isdn1:LAN> cd
isdn1>
isdn1> set user isdn2
New user isdn2 being created
isdn1:isdn2>
isdn1:isdn2> set bridging off
isdn1:isdn2> set ip routing on
isdn1:isdn2> set ip address 172.16.3.1
isdn1:isdn2> set ip netmask 255.255.255.0
isdn1:isdn2> set 1 number 8358662
isdn1:isdn2> set 2 number 8358664
isdn1:isdn2>
isdn1:isdn2> set active
01/01/1995 00:24:36  Connection 2 Opened
isdn1:isdn2>
isdn1:isdn2> set ip route dest 0.0.0.0/0 gateway 172.16.3.2 propagate on cost 1
isdn1:isdn2>
isdn1:isdn2> cd
isdn1>
isdn1> reboot

Boot version 2.1(2) 11/07/97 16:06
Copyright (c) 1993-1997.  All rights reserved.
POST ..... OK (1.5MB).
Waiting ...
Booting up ..............................
01/01/1995 00:00:00  Connection 1 Opened
isdn1> 01/01/1995 00:00:00  L01  0              Started Operation
isdn1> 01/01/1995 00:00:00  Connection 2 Opened
isdn1> 01/01/1995 00:00:01  L02  0              Line Activated
isdn1>
Please wait for TWAIT timer to expire in 31 seconds
Make a call to bypass this timer
01/01/1995 00:00:32  L18  1              Terminal Identifier Assigned
isdn1> 01/01/1995 00:00:32  L22  1   0835866101  Sending SPID
```

```
isdn1> 01/01/1995 00:00:32  L18  2              Terminal Identifier Assigned
isdn1> 01/01/1995 00:00:32  L23  1   0835866101  SPID Accepted
isdn1> 01/01/1995 00:00:32  L22  2   0835866301  Sending SPID
isdn1> 01/01/1995 00:00:32  L23  2   0835866301  SPID Accepted
isdn1>
isdn1> show status
Status    01/01/1995 00:00:46
Line Status
  Line Activated
  Terminal Identifier Assigned    SPID Accepted
  Terminal Identifier Assigned    SPID Accepted
Port Status                                      Interface Connection Link
  Ch:  1      Waiting for Call
  Ch:  2      Waiting for Call
isdn1>
isdn1>
```

ISDN2 Router Configuration:

```
> set systemname isdn2
isdn2> set ppp authentication incoming chap
isdn2> set ppp secret host 12345
isdn2>
isdn2> set switch NI-1
isdn2>
Please wait for TWAIT timer to expire in 121 seconds
Make a call to bypass this timer
01/01/1995 00:41:01  L18  1              Terminal Identifier Assigned
isdn2>
isdn2> set 1 spid 0835866201
You may reboot system to register the new SPID at any time.
isdn2> set 2 spid 0835866401
You may reboot system to register the new SPID at any time.
isdn2>
isdn2> set 1 directorynumber 835-8662
isdn2> set 2 directorynumber 835-8664
isdn2>


isdn2> cd lan
isdn2:LAN>
isdn2:LAN> set bridging off
isdn2:LAN> set ip routing on
isdn2:LAN> set ip address 172.16.2.1
isdn2:LAN> set ip netmask 255.255.255.0
isdn2:LAN>
isdn2:LAN> cd
isdn2>
isdn2> set user isdn1
New user isdn1 being created
isdn2:isdn1>
isdn2:isdn1> set bridging off
isdn2:isdn1> set ip routing on
isdn2:isdn1> set ip address 172.16.3.2
isdn2:isdn1> set ip netmask 255.255.255.0
isdn2:isdn1>
isdn2:isdn1> set active
01/01/1995 00:43:59  Connection 2 Opened
isdn2:isdn1>
isdn2:isdn1> set ip route dest 0.0.0.0/0 gateway 172.16.3.1 propagate on cost 1
isdn2:isdn1>
isdn2:isdn1> cd
isdn2>
```

```
isdn2> reboot
Boot version 2.1(2) 11/07/97 16:06
Copyright (c) 1993-1997.  All rights reserved.
POST ............ OK (1.5MB).Validating FLASH ... OK.
Waiting ...
Booting up ..............................
01/01/1995 00:00:00  Connection 1 Opened
isdn2> 01/01/1995 00:00:00  L01  0               Started Operation
isdn2> 01/01/1995 00:00:00  Connection 2 Opened
isdn2> 01/01/1995 00:00:01  L02  0               Line Activated
isdn2>
Please wait for TWAIT timer to expire in 121 seconds
Make a call to bypass this timer
01/01/1995 00:02:02  L18  1               Terminal Identifier Assigned
isdn2> 01/01/1995 00:02:02  L22  1   0835866201  Sending SPID
isdn2> 01/01/1995 00:02:02  L18  2               Terminal Identifier Assigned
isdn2> 01/01/1995 00:02:02  L23  1   0835866201  SPID Accepted
isdn2> 01/01/1995 00:02:02  L22  2   0835866401  Sending SPID
isdn2> 01/01/1995 00:02:02  L23  2   0835866401  SPID Accepted
isdn2>
isdn2> show status
Status    01/01/1995 00:02:49
Line Status
  Line Activated
  Terminal Identifier Assigned    SPID Accepted
  Terminal Identifier Assigned    SPID Accepted
Port Status                                      Interface Connection Link
  Ch:  1      Waiting for Call
  Ch:  2      Waiting for Call
isdn2>
isdn2>
```

ISDN1 complete router configuration using the upload command :

```
isdn1>
isdn1> upload
CD
SET SCREENLENGTH 20
SET COUNTRYGROUP 1
SET LAN MODE ANY
SET WAN MODE ONLY
SET AGE OFF
SET MULTIDESTINATION OFF
SET SWITCH NI-1
SET 1 SPID 0835866101
SET 1 DIRECTORYNUMBER 8358661
SET 2 SPID 0835866301
SET 2 DIRECTORYNUMBER 8358663
SET AUTODETECTION  OFF
SET CONFERENCE 60
SET TRANSFER 61
SET 1 DELAY 30
SET 2 DELAY 30
SET BRIDGING ON
SET LEARN ON
SET PASSTHRU OFF
SET SPEED AUTO
SET PLAN NORMAL
SET D AUTO OFF
SET 1 AUTO ON
SET 2 AUTO ON
SET 1 NUMBER
SET 2 NUMBER
SET AODI OFF
SET 1 BACKUPNUMBER
SET 2 BACKUPNUMBER
SET 1 RINGBACK
SET 2 RINGBACK
SET 1 CLIVALIDATENUMBER
SET 2 CLIVALIDATENUMBER
SET CLICALLBACK OFF
SET CLIAUTHENTICATION OFF
SET SYSTEMNAME isdn1
LOG CALLS TIME VERBOSE
SET UNICASTFILTER OFF
DEMAND D THRESHOLD 0
DEMAND 1 THRESHOLD 0
DEMAND 2 THRESHOLD 48
DEMAND D DURATION 1
DEMAND 1 DURATION 1
DEMAND 2 DURATION 1
DEMAND D SOURCE LAN
DEMAND 1 SOURCE LAN
DEMAND 2 SOURCE BOTH
TIMEOUT D THRESHOLD 0
TIMEOUT 1 THRESHOLD 0
TIMEOUT 2 THRESHOLD 48
TIMEOUT D DURATION 0
TIMEOUT 1 DURATION 0
TIMEOUT 2 DURATION 0
TIMEOUT D SOURCE LAN
TIMEOUT 1 SOURCE LAN
TIMEOUT 2 SOURCE BOTH
SET REMOTEACCESS PROTECTED
```

```
SET LOCALACCESS ON
SET LOGOUT 5
SET CALLERID OFF
SET PPP AUTHENTICATION IN CHAP  PAP
SET PPP CHAPREFUSE NONE
SET PPP CHAPALLOW MULTIHOST OFF
SET PPP MAGICNUMBERCHECK ON
SET PPP AUTHENTICATION OUT CHAP
SET PPP AUTHENTICATION ACCEPT EITHER
SET PPP TAS CLIENT 0.0.0.0
SET PPP TAS CHAPSECRET LOCAL ON
SET PPP SECRET CLIENT ENCRYPTED 040a59555b74
SET PPP CALLBACK REQUEST OFF
SET PPP CALLBACK REPLY OFF
SET PPP NEGOTIATION INTEGRITY 10
SET PPP NEGOTIATION COUNT 10
SET PPP NEGOTIATION RETRY  3000
SET PPP TERMREQ COUNT 2
SET PPP MULTILINK ON
SET PPP MULTILINK PPPHEADER ON
SET COMPRESSION STAC
SET PPP BACP ON
SET PPP ADDRESS NEGOTIATION LOCAL OFF
SET PPP IP NETMASK LOCAL OFF
SET IP PAT UDPTIMEOUT 5
SET IP PAT TCPTIMEOUT 30
SET IP RIP TIME 30
SET X25 LIC 0
SET X25 HIC 0
SET X25 LTC 0
SET X25 HTC 0
SET X25 LOC 1024
SET X25 HOC 1024
SET CALLDURATION 0
SET SNMP CONTACT ""
SET SNMP LOCATION ""
SET SNMP TRAP COLDSTART OFF
SET SNMP TRAP WARMSTART OFF
SET SNMP TRAP LINKDOWN OFF
SET SNMP TRAP LINKUP OFF
SET SNMP TRAP AUTHENTICATIONFAIL OFF
SET DHCP OFF
SET DHCP DOMAIN
SET DHCP NETBIOS_SCOPE
SET TPAD PARITY NONE
SET X25D TEI 0
SET X25D X121HOST
SET VOICEPRIORITY INCOMING INTERFACE PHONE1 ALWAYS
SET VOICEPRIORITY OUTGOING INTERFACE PHONE1 ALWAYS
SET CALLWAITING INTERFACE PHONE1 ON
SET VOICEPRIORITY INCOMING INTERFACE PHONE2 ALWAYS
SET VOICEPRIORITY OUTGOING INTERFACE PHONE2 ALWAYS
SET CALLWAITING INTERFACE PHONE2 ON
SET CALLTIME VOICE INCOMING OFF
SET CALLTIME VOICE OUTGOING OFF
SET CALLTIME DATA INCOMING OFF
SET CALLTIME DATA OUTGOING OFF
SET USER LAN
SET BRIDGING OFF
SET IP ROUTING ON
```

```
SET IP ADDRESS 172.16.4.1
SET IP NETMASK 255.255.255.0
SET IP FRAMING ETHERNET_II
SET IP PROPAGATE ON
SET IP COST 1
SET IP RIP RECEIVE V1
SET IP RIP UPDATE OFF
SET IP RIP VERSION 1
SET USER Internal
SET IP FRAMING ETHERNET_II
SET USER Standard
SET PROFILE ID 000000000000
SET PROFILE POWERUP ACTIVATE
SET PROFILE DISCONNECT KEEP
SET IP ROUTING ON
SET IP ADDRESS 0.0.0.0
SET IP NETMASK 0.0.0.0
SET IP FRAMING NONE
SET IP RIP RECEIVE V1
SET IP RIP UPDATE OFF
SET IP RIP VERSION 1
SET NETBIOS FILTER ON
SET USER isdn2
SET PROFILE ID 000000000000
SET PROFILE POWERUP ACTIVATE
SET PROFILE DISCONNECT KEEP
SET BRIDGING OFF
SET 1 NUMBER 8358662
SET 2 NUMBER 8358664
SET IP ROUTING ON
SET IP ADDRESS 172.16.3.1
SET IP NETMASK 255.255.255.0
SET IP FRAMING NONE
SET IP PROPAGATE ON
SET IP COST 1
SET IP RIP RECEIVE V1
SET IP RIP UPDATE OFF
SET IP RIP VERSION 1
SET NETBIOS FILTER ON
SET IP ROUTE DEST 0.0.0.0/0 GATEWAY 172.16.3.2 PROPAGATE ON COST 1
CD
SET BUTTON isdn2
SET SERIALPORT CONFIG
LOGOUT
```

Successful Cisco 700 series router boot up:

```
isdn1> reboot
Boot version 2.1(2) 11/07/97 16:06
Copyright (c) 1993-1997. All rights reserved.
POST ............ OK (1.5MB).
Validating FLASH ... OK.
Waiting ...
Booting up ..............................
01/01/1995 00:00:00  Connection 1 Opened
isdn1> 01/01/1995 00:00:00  L01  0              Started Operation
isdn1> 01/01/1995 00:00:00  Connection 2 Opened
isdn1> 01/01/1995 00:00:01  L02  0              Line Activated
isdn1>
Please wait for TWAIT timer to expire in 31 seconds
```

```
Make a call to bypass this timer
01/01/1995 00:00:32  L18  1              Terminal Identifier Assigned
isdn1> 01/01/1995 00:00:32  L22  1   0835866101  Sending SPID
isdn1> 01/01/1995 00:00:32  L18  2              Terminal Identifier Assigned
isdn1> 01/01/1995 00:00:32  L23  1   0835866101  SPID Accepted
isdn1> 01/01/1995 00:00:32  L22  2   0835866301  Sending SPID
isdn1> 01/01/1995 00:00:32  L23  2   0835866301  SPID Accepted
isdn1>
isdn1> show status
Status    01/01/1995 00:00:46
Line Status
  Line Activated
  Terminal Identifier Assigned    SPID Accepted
  Terminal Identifier Assigned    SPID Accepted
Port Status                                        Interface Connection Link
  Ch:  1      Waiting for Call
  Ch:  2      Waiting for Call
isdn1>
isdn1>
```

Making a call from ISDN1 router to ISDN2 router:

```
isdn1> cd isdn2
isdn1:isdn2> ping 172.16.2.1 ← trigger the call
Start sending:    01/01/1995 00:44:28  L05  0      8358662  Outgoing Call Initiated
isdn1:isdn2> 01/01/1995 00:44:30  L08  1      8358662  Call Connected
isdn1:isdn2> 01/01/1995 00:44:31  Connection 2 Add     Link 1 Channel 1
isdn1:isdn2>  no response.
Start sending:     round trip time is 30 msec.
isdn1:isdn2>
isdn1:isdn2> show connection
Connections    01/01/1995 00:44:45
    Start Date & Time   #  Name                #     Ethernet
  1 01/01/1995 00:00:00 #                     # 00 00 00 00 00 00
  2 01/01/1995 00:00:00 # isdn2               #
           Link: 1 Channel:  1 Phone: 8358662
isdn1:isdn2>
isdn1:isdn2> show status
Status    01/01/1995 00:44:51
Line Status
  Line Activated
  Terminal Identifier Assigned    SPID Accepted
  Terminal Identifier Assigned    SPID Accepted
Port Status                                      Interface Connection Link
  Ch:  1   64K Call In Progress         8358662        DATA          2      1
  Ch:  2      Waiting for Call
isdn1:isdn2>
isdn1:isdn2> disconnect
01/01/1995 00:44:57  Connection 2 Remove  Link 1 Channel 1
isdn1:isdn2> isdn1:isdn2> 01/01/1995 00:44:57  L13  1              Disconnecting
Call
isdn1:isdn2> 01/01/1995 00:44:57  L27  1               Disconnected
isdn1:isdn2>
isdn1:isdn2> show connection
Connections    01/01/1995 00:45:04
    Start Date & Time   #  Name                #     Ethernet
  1 01/01/1995 00:00:00 #                     # 00 00 00 00 00 00
  2 01/01/1995 00:00:00 # isdn2               #
isdn1:isdn2>
isdn1:isdn2> show status
Status    01/01/1995 00:45:09
Line Status
  Line Activated
  Terminal Identifier Assigned    SPID Accepted
  Terminal Identifier Assigned    SPID Accepted
Port Status                                      Interface Connection Link
  Ch:  1      Waiting for Call
  Ch:  2      Waiting for Call
isdn1:isdn2>
```

Some useful SHOW commands:

1) system mode

```
isdn1> show status
Status    01/01/1995 00:46:53
Line Status
  Line Activated
 Terminal Identifier Assigned    SPID Accepted
  Terminal Identifier Assigned    SPID Accepted
Port Status                                        Interface Connection Link
 Ch:  1   64K Call In Progress         8358662      DATA          2      1
  Ch:  2      Waiting for Call
isdn1>
isdn1> show connection
Connections    01/01/1995 00:46:58
    Start Date & Time   #  Name                #     Ethernet
  1 01/01/1995 00:00:00 #                     # 00 00 00 00 00 00
  2 01/01/1995 00:00:00 # isdn2                #
           Link: 1 Channel:  1 Phone: 8358662
isdn1>
isdn1> show users
User                   State      Connection
-------------------------------------------
LAN                    Active     LAN
Internal               Active     INTERNAL
Standard               Active     1
isdn2                  Active     2
isdn1>
```

```
isdn1> show config
System Parameters
    Environment
      Screen Length          20
      Echo Mode              ON
     CountryGroup            1
    Bridging Parameters
     LAN Forward Mode        ANY
      WAN Forward Mode       ONLY
      Address Age Time       OFF
    Call Startup Parameters
     Multidestination        OFF
    Line Parameters
      Switch Type            NI-1
      Svc Profile ID 1       0835866101
      Directory Number(s)    8358661
      Svc Profile ID 2       0835866301
      Directory Number(s)    8358663
      Auto SPID and Switch Detection   OFF
      Conference access code 60
<Q> and <enter> to Quit or <enter> for MORE
      Transfer access code   61
    Call Parameters          Link 1          Link 2          Link D
      Retry Delay              30              30
      Button                 isdn2
      Serial Port State      CONFIG

Profile Parameters
    Bridging Parameters
      Bridging               ON
      Routed Protocols       IP
      Learn Mode             ON
      Passthru               OFF
    Call Startup Parameters
    Line Parameters
      Line Speed             AUTO
      Numbering Plan         NORMAL
    Call Parameters          Link 1          Link 2          Link D
      Auto                     ON              ON              OFF
      Permanent               OFF             OFF              OFF
<Q> and <enter> to Quit or <enter> for MORE
      Called Number
      Backup Number
      Ringback Number
      CLI Validate Number
    CLICallback              OFF
    CLIAuthentication        OFF

isdn1>
```

```
isdn1> show security
System Parameters
    Security
      Access Status            ON
     System Password           NONE
      Remote Configuration     PROTECTED
     Local Configuration       ON
      Logout Timeout           5
     Caller ID Security        OFF
      Caller Id Numbers

    PPP Security
      PPP Authentication  IN   CHAP  PAP
      CHAP REFUSE              NONE
      CHAP ALLOW MULTIHOST     OFF
      MAGIC NUMBER CHECK       ON

Profile Parameters
    PPP Security
      PPP Authentication OUT   CHAP
<Q> and <enter> to Quit or <enter> for MORE
      PPP Authentication ACCEPT   EITHER
      Token Authentication Support
        TAS Client             0.0.0.0
        Use Local CHAP Secret  ON
      Client
        User Name              isdn1
        PAP Password           NONE
        CHAP Secret            EXISTS
      Host
        PAP Password           NONE
        CHAP Secret            NONE
      Callback
        Request                OFF
        Reply                  OFF
isdn1>
```

```
isdn1> show ip config
Profile     Routing Frame IP Address      Netmask         RIP TX  RX  Prop Cost
-------------------------------------------------------------------------------
LAN         ON      ETH2  172.16.4.1      255.255.255.0   V1  OFF V1  ON   1
Standard    ON      IPCP  0.0.0.0         0.0.0.0         V1  OFF V1  ON   1
isdn2       ON      IPCP  172.16.3.1      255.255.255.0   V1  OFF V1  ON   1

Profile     PAT Multicast Summarization Netbios Spoofing/Left(min)
-------------------------------------------------------------------
LAN         OFF OFF       OFF           OFF             /0
Standard    OFF OFF       OFF           OFF             /0
isdn2       OFF OFF       OFF           OFF             /0

isdn1>
isdn1> show ip route
Profile         Type Destination     Bits Gateway         Prop Cost Source Age
-------------------------------------------------------------------------------
isdn2           NET  172.16.3.0      24   DIRECT          ON   1    DIRECT 0
LAN             NET  172.16.4.0      24   DIRECT          ON   1    DIRECT 0
isdn2           NET  0.0.0.0         0    172.16.3.2      ON   1    STATIC 0
isdn1>
isdn1>
```

2) ***User Profile Mode***

```
isdn1> cd isdn2
isdn1:isdn2>
isdn1:isdn2> show status
Status    01/01/1995 00:48:32
Line Status
 Line Activated
  Terminal Identifier Assigned    SPID Accepted
  Terminal Identifier Assigned    SPID Accepted
Port Status                                        Interface Connection Link
  Ch:  1   64K Call In Progress         8358662       DATA          2      1
  Ch:  2      Waiting for Call
isdn1:isdn2>

isdn1:isdn2> show connection
Connections    01/01/1995 00:48:38
    Start Date & Time   #  Name                 #     Ethernet
  1 01/01/1995 00:00:00 #                      # 00 00 00 00 00 00
  2 01/01/1995 00:00:00 # isdn2                 #
            Link: 1 Channel:  1 Phone: 8358662
isdn1:isdn2>
isdn1:isdn2> show users
User                    State      Connection
-----------------------------------------
LAN                     Active     LAN
Internal                Active     INTERNAL
Standard                Active     1
isdn2                   Active     2
```

```
isdn1:isdn2> show config

Profile Parameters
    Bridging Parameters
      Bridging                OFF<*>
      Routed Protocols        IP <*>
      Learn Mode              ON
      Passthru                OFF
    Call Startup Parameters
    Line Parameters
      Line Speed              AUTO
      Numbering Plan          NORMAL
    Call Parameters           Link 1          Link 2          Link D
      Auto                      ON              ON              OFF
      Permanent                 OFF             OFF             OFF
      Called Number        8358662<*>      8358664<*>
      Backup Number
      Ringback Number
      CLI Validate Number
    CLICallback               OFF
<Q> and <enter> to Quit or <enter> for MORE
    CLIAuthentication         OFF

isdn1:isdn2>
isdn1:isdn2> show security

Profile Parameters
    PPP Security
      PPP Authentication OUT   CHAP
      PPP Authentication ACCEPT   EITHER
      Token Authentication Support
        TAS Mode                OFF
        TAS Client              0.0.0.0
        Use Local CHAP Secret   ON
      Client
        User Name               isdn1
        PAP Password            NONE
        CHAP Secret             EXISTS
      Host
        PAP Password            NONE
        CHAP Secret             NONE
      Callback
        Request                 OFF
        Reply                   OFF
```

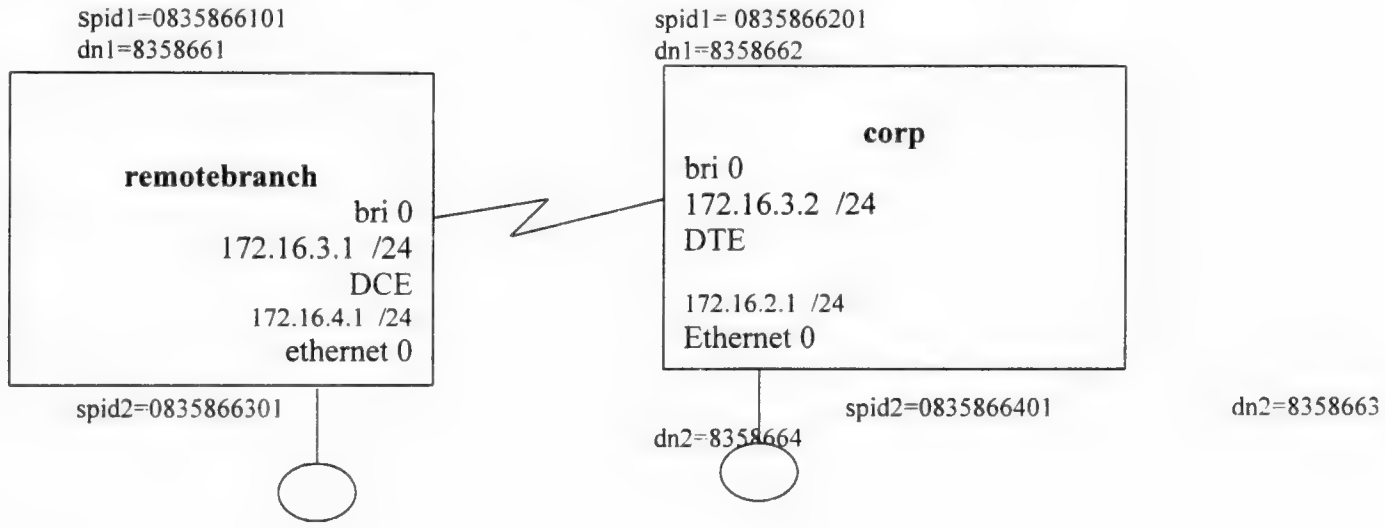
```
isdn1:isdn2>
isdn1:isdn2> show ip config
Profile     Routing Frame IP Address      Netmask         RIP TX  RX  Prop Cost
-------------------------------------------------------------------------------
isdn2       ON      IPCP  172.16.3.1      255.255.255.0   V1  OFF V1  ON   1

Profile     PAT Multicast Summarization Netbios Spoofing/Left(min)
-------------------------------------------------------------------
isdn2       OFF OFF       OFF           OFF             /0

isdn1:isdn2>
isdn1:isdn2> show ip route
Profile         Type Destination     Bits Gateway         Prop Cost Source Age
-------------------------------------------------------------------------------
isdn2           NET  172.16.3.0      24   DIRECT          ON   1    DIRECT 0
isdn2           NET  0.0.0.0         0    172.16.3.2      ON   1    STATIC 0
isdn1:isdn2>
isdn1:isdn2>
```

dialer map:
define how to get to the next hop.

In the routing table, Destination net | mask | cost | next Hop

Cisco 800 series ISDN Legacy DDR configuration

Two Cisco 800 series routers will be configured for legacy DDR routing. The remotebranch router will be configured to call the corp router and vice a versa.




```
config t
hostname remotebranch
ip routing
int ethernet 0
ip address 172.16.4.1 255.255.255.0
exit

dialer-list 2 protocol ip permit
ip route 0.0.0.0 0.0.0.0 172.16.3.2
ip route 172.16.2.0 255.255.255.0 172.16.3.2
isdn switch-type basic-ni
username corp password 12345

interface bri 0
ip address 172.16.3.1 255.255.255.0
encapsulation ppp
ppp authentication chap
dialer idle-timeout 60
dialer map ip 172.16.3.2 name corp 8358662
dialer-group 2
isdn spid1 0835866101 8358661
isdn spid2 0835866301 8358663
no shutdown
```

```
config t
hostname corp
ip routing
int ethernet 0
ip address 172.16.2.1 255.255.255.0
exit

dialer-list 2 protcol ip permit
ip route 0.0.0.0  0.0.0.0  172.16.3.1
ip route 172.16.4.0 255.255.255.0    172.16.3.1
isdn switch-type basic-ni
username remotebranch password 12345

interface bri 0
ip address 172.16.3.2 255.255.255.0
encapsulation ppp
ppp authentication chap
dialer idle-timeout 60
dialer map ip 172.16.3.1 name remotebranch 8358661
dialer-group 2
isdn spid1 0835866201 8358662
isdn spid2 0835866401 8358664
```

next hop

spid #

DN #

spid #, DN # are on Telfone sw.

==========

excecute the following : show run , sh ip route , sh isdn status, sh isdn active , sh dialer, debug isdn events 9 & then ping the other machine) , debug isdn q931

==========

PPP multilink - a link is busy, reach the threadhold. then trigger other link (second link).

Using the previous exercise, we will enable ppp multilink to bring up the second ISDN B-channel when a traffic threshold is exceeded. By generating enough traffic from a client PC the multilink feature should kick-in. ***PPP mulitlink must be enabled at both routers to work !!!***

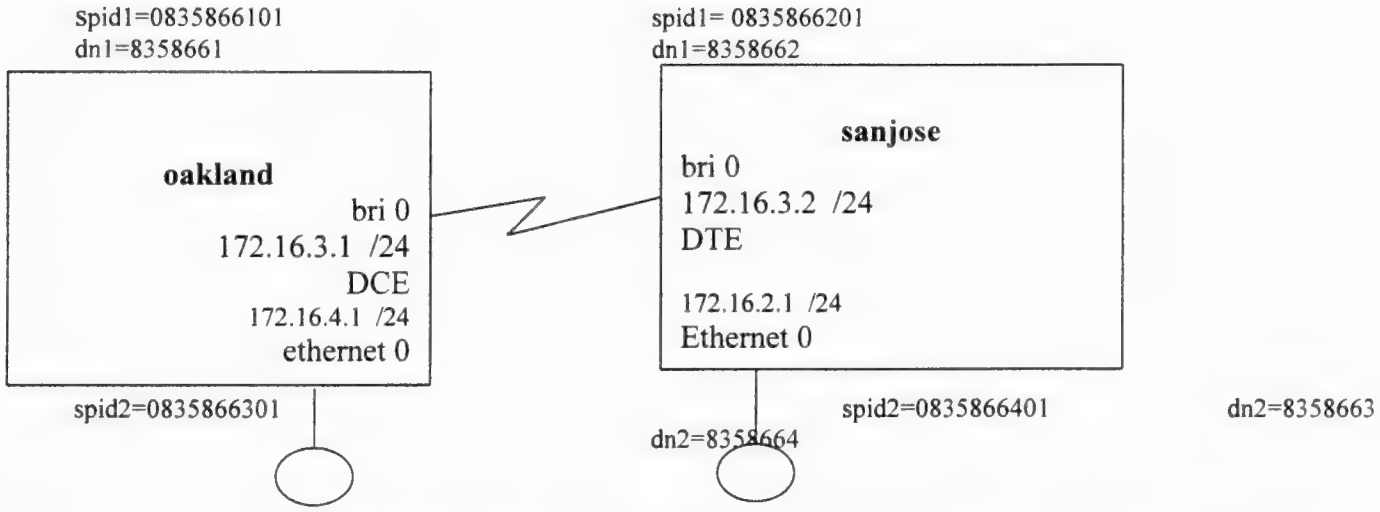
```
remotebranch#
remotebranch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
remotebranch(config)#int bri 0
remotebranch(config-if)#
remotebranch(config-if)#ppp ?
  authentication  Set PPP link authentication method
  bap             Set BAP bandwidth allocation parameters
  bridge          Enable PPP bridge translation
  callback        Set PPP link callback option
  chap            Set CHAP authentication parameters
  compression     Enable PPP Compression control negotiation
  lcp             PPP LCP configuration
  max-bad-auth    Allow multiple authentication failures
  multilink       Make interface multilink capable
  pap             Set PAP authentication parameters
  quality         Set minimum Link Quality before link is down
  reliable-link   Use LAPB with PPP to provide a reliable link
  timeout         Set PPP timeout parameters
  use-tacacs      Use TACACS to verify PPP authentications

remotebranch(config-if)#ppp multilink
remotebranch(config-if)#
remotebranch(config-if)#dialer ?
  callback-secure        Enable callback security
  caller                 Specify calling telephone number to be screened
  enable-timeout         Set length of time an interface stays down before it
                         is available for dialing
  fast-idle              Set idle time before disconnecting line with an
                         unusually high level of contention
  hold-queue             Configure output hold queue
  idle-timeout           Specify idle timeout before disconnecting line
  load-threshold         Specify threshold for placing additional calls
  map                    Define multiple dial-on-demand numbers
  pool-member            Specify dialer pool membership
  priority               Specify priority for use in dialer group
  rotary-group           Add to a dialer rotary group
  snapshot               Specify snapshot sequence number for Dialer Profiles
  string                 Specify telephone number to be passed to DCE device
  wait-for-carrier-time  How long the router will wait for carrier
  watch-disable          Time to wait before bringing down watched route link
  watch-group            Assign interface to dialer-watch-list

remotebranch(config-if)#dialer load-threshold ?
  <1-255>  Load threshold to place another call

remotebranch(config-if)#dialer load-threshold 10 ?
  either    Threshold decision based on max of inbound and outbound traffic
  inbound   Threshold decision based on inbound traffic only
  outbound  Threshold decision based on outbound traffic only
  <cr>

remotebranch(config-if)#dialer load-threshold 10 either
remotebranch(config-if)#^Z
remotebranch#
00:05:26: %SYS-5-CONFIG_I: Configured from console by console
remotebranch#
```

```
remotebranch#show run
Building configuration...

Current configuration:
!
version 12.0
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname remotebranch
!
enable secret 5 $1$0dW/$jR2RK3WXDRjDLYaq6mHQ90
enable password 12345
!
username corp password 0 12345
!
ip subnet-zero
!
isdn switch-type basic-ni
!
!
!
interface Ethernet0
 ip address 172.16.4.1 255.255.255.0
 no ip directed-broadcast
!
interface BRI0
 ip address 172.16.3.1 255.255.255.0
 no ip directed-broadcast
 encapsulation ppp
 dialer idle-timeout 180
 dialer map ip 172.16.3.2 name corp 8358662
 dialer load-threshold 10 either
 dialer-group 2
 isdn switch-type basic-ni
 isdn spid1 0835866101 8358661
 isdn spid2 0835866301 8358663
 ppp authentication chap
 ppp multilink
!
no ip http server
ip classless
ip route 0.0.0.0 0.0.0.0 172.16.3.2
ip route 172.16.2.0 255.255.255.0 172.16.3.2
!
dialer-list 2 protocol ip permit
!
line con 0
 transport input none
 stopbits 1
line vty 0 4
 password 12345
 login
!

remotebranch#debug ppp multilink ?
  events     Multilink events
  fragments  Multilink fragments
```

```
remotebranch#debug ppp multilink events
Multilink events debugging is on
remotebranch#
00:33:07: %LINK-3-UPDOWN: Interface BRI0:1, changed state to up
00:33:07: BR0:1 MLP: Multilink up event pending
00:33:07: Vi1 MLP: Added to huntgroup BR0
00:33:07: Vi1 MLP: Clone from BR0
00:33:07: %LINK-3-UPDOWN: Interface Virtual-Access1, changed state to up
00:33:07: BR0:1 MLP: corp, multilink up, first link
00:33:08: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:1, changed state to up
00:33:08: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access1, changed state to up
00:33:13: %ISDN-6-CONNECT: Interface BRI0:1 is now connected to 8358662 corp
remotebranch#
00:33:58: %LINK-3-UPDOWN: Interface BRI0:2, changed state to up
00:33:58: BR0:2 MLP: Multilink up event pending
00:33:58: BR0:2 MLP: corp, multilink up
00:33:59: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:2, changed state to up
00:34:04: %ISDN-6-CONNECT: Interface BRI0:1 is now connected to 8358662 corp
remotebranch#
remotebranch#show isdn active
--------------------------------------------------------------------------------
                                ISDN ACTIVE CALLS
--------------------------------------------------------------------------------
History table has a maximum of 100 entries.
History table data is retained for a maximum of 15 Minutes.
--------------------------------------------------------------------------------
Call     Calling      Called       Remote  Seconds Seconds Seconds Charges
Type     Number       Number       Name    Used    Left    Idle    Units/Currency
--------------------------------------------------------------------------------
Out      8358662      8358661        corp       85                0
Out      8358664      8358661        corp       34                0
--------------------------------------------------------------------------------

remotebranch#

remotebranch#show ppp multilink

Virtual-Access1, bundle name is corp
  Dialer interface is BRI0
  0 lost fragments, 2 reordered, 0 unassigned, sequence 0x4CD/0x34E rcvd/sent
  0 discarded, 0 lost received, 53/255 load
  Member links: 2 (max not set, min not set)
    BRI0:1
    BRI0:2
remotebranch#
remotebranch#
00:36:11: BR0:1 MLP: Multilink down event pending
00:36:11: BR0:2 MLP: Multilink down event pending
00:36:11: BR0:1 MLP: Removing link from corp
00:36:11: corp MLP: Enable idle link BR0:2, weight 240
00:36:11: BR0:2 MLP: Removing link from corp
00:36:11: corp MLP: Removing bundle
00:36:11: %LINK-3-UPDOWN: Interface Virtual-Access1, changed state to down
00:36:12: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:1, changed state to down
00:36:12: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:2, changed state to down
00:36:12: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access1, changed state to down
00:36:51539607552: %ISDN-6-DISCONNECT: Interface BRI0:1  disconnected from 8358662 corp, call lasted 185
seconds
00:36:51545387884: %LINK-3-UPDOWN: Interface BRI0:1, changed state to down
00:36:51539607552: %ISDN-6-DISCONNECT: Interface BRI0:2  disconnected from 8358664 corp, call lasted 134
seconds
00:36:51545387884: %LINK-3-UPDOWN: Interface BRI0:2, changed state to down
```

Cisco 800 series ISDN advanced DDR configuration using dialer profiles

Control interesting traffic



In this exercise you will use dialer profiles on the Cisco 800 series ISDN routers so that the oakland site can call the sanjose site and vice a versa. Interesting traffic will now be specified using extended ip access lists along with the dialer-list and dialer-group commands. A virtual dialer interface will be created to control the DDR and will use a map-class statement to specify call bandwidth (56K) and idle-timeout parameters. Also a dialer pool statement will link the virtual dialer interface to the physical isdn bri 0 interface. Multilink can be configured as an optional add-on exercise if desired. Verify interesting traffic and DDR by using client services such as telnet, ftp, www, and ping.

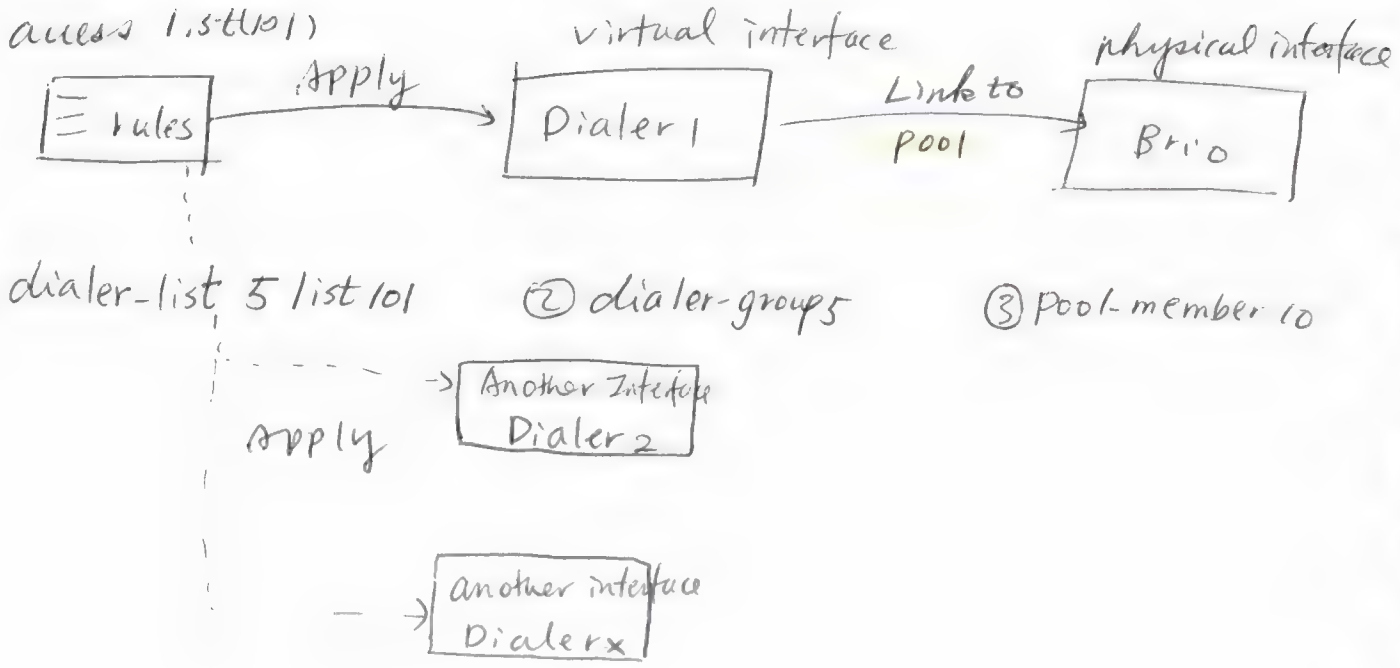
==========

Execute the following cmds -

Sh run, debug ppp authentication , debug dialer , then ping the other machine , show dialer ,

sh interface dialer 1 , sh int bri 0 , sh isdn status , sh isdn active ,

: properties of virtual Links



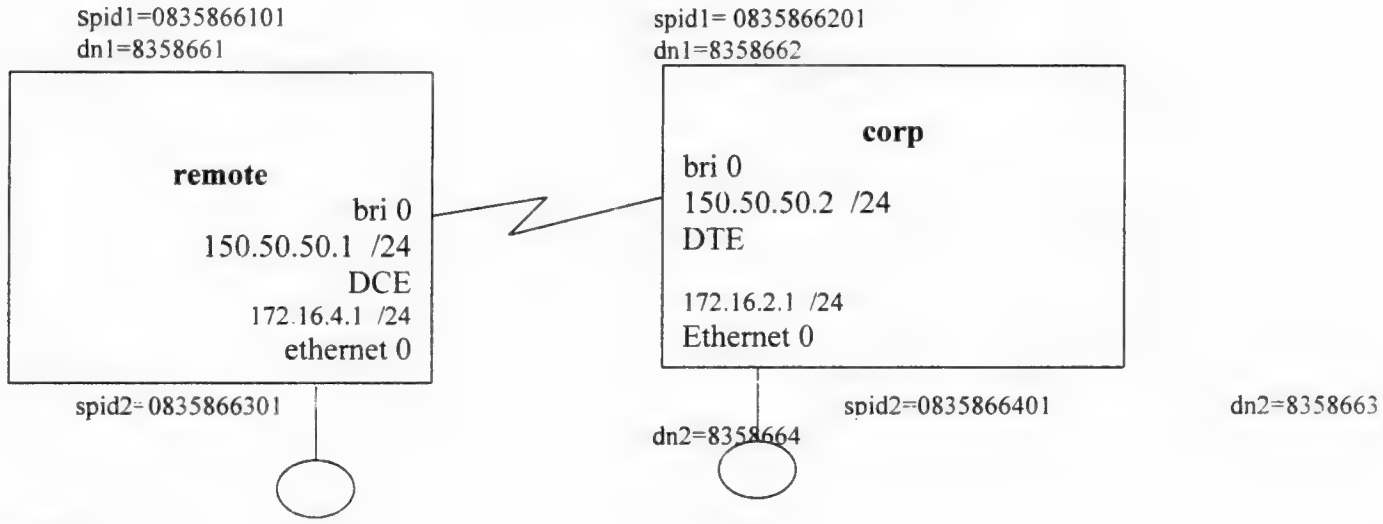
define: who to allow/ who is not allowed

oakland configuration
Config t
Hostname oakland
Username sanjose password 12345
Ip routing
Isdn switch-type basic-ni
Access-list 101 permit tcp any any eq telnet
Access-list 101 deny tcp any any eq ftp
Access-list 101 permit tcp any any eq 80
Access-list 101 permit ip any any
(1) Dialer-list 5 list 101
Ip route 172.16.2.0 255.255.255.0 172.16.3.2
Ip route 0.0.0.0 0.0.0.0 172.16.3.2
Ip http server
Int ethernet 0
Ip address 172.16.4.1 255.255.255.0
No shutdown
Interface dialer 1
Ip address 172.16.3.1 255.255.255.0
Encapsulation ppp
Ppp authentication chap
(2) Dialer-group 5
(3) Dialer pool 10 Link to bri0
Dialer string 8358662 class isdn-profile
Dialer remote-name sanjose
Exit
Map-class dialer isdn-profile
Dialer isdn speed 56
Dialer idle-timeout 120
Interface bri 0
Encapsulation ppp
No ip address
Dialer pool-member 10
Isdn spid1 0835866101 8358661
Isdn spid2 0835866301 8358663
No shutdown

Will be Linked

sanjose configuration
Config t
Hostname sanjose
Username oakland password 12345
Ip routing
Isdn switch-type basic-ni
Access-list 101 permit tcp any any eq telnet
Access-list 101 deny tcp any any eq ftp
Access-list 101 permit tcp any any eq 80
Access-list 101 permit ip any any
Dialer-list 5 list 101
Ip route 172.16.4.0 255.255.255.0 172.16.3.1
Ip route 0.0.0.0 0.0.0.0 172.16.3.1
Ip http server
Int ethernet 0
Ip address 172.16.2.1 255.255.255.0
No shutdown
Interface dialer 1
Ip address 172.16.3.2 255.255.255.0
Encapsulation ppp
Ppp authentication chap
Dialer-group 5
Dialer pool 10
Dialer string 8358661 class isdn-profile
Dialer remote-name oakland
Exit
Map-class dialer isdn-profile
Dialer isdn speed 56
Dialer idle-timeout 120
Interface bri 0
Encapsulation ppp
No ip address
Dialer pool-member 10
Isdn spid1 0835866201 8358662
Isdn spid2 0835866401 8358664
No shutdown

NAT Network Address Translation




```
config t
hostname remote
ip routing
int ethernet 0
ip address 172.16.4.1 255.255.255.0
exit
dialer-list 2 protocol ip permit
ip route 0.0.0.0 0.0.0.0 150.50.50.2
ip route 172.16.2.0 255.255.255.0 150.50.50.2
isdn switch-type basic-ni
username corp password 12345

interface bri 0
ip address 150.50.50.1 255.255.255.0
encapsulation ppp
ppp authentication chap
dialer idle-timeout 60
dialer map ip 150.50.50.2 name corp 8358662

dialer-group 2
isdn spid1 0835866101 8358661
isdn spid2 0835866301 8358663
```

```
config t
hostname corp
ip routing
int ethernet 0
ip address 172.16.2.1 255.255.255.0
exit
dialer-list 2 protcol ip permit
ip route 0.0.0.0  0.0.0.0  150.50.50.1
ip route 172.16.4.0 255.255.255.0     150.50.50.1
isdn switch-type basic-ni
username remote password 12345

interface bri 0
ip address 150.50.50.2 255.255.255.0
encapsulation ppp
ppp authentication chap
dialer idle-timeout 60
dialer map ip 150.50.50.1 name remote 8358661

dialer-group 2
isdn spid1 0835866201 8358662
isdn spid2 0835866401 8358664
```

```
interface e0
ip nat inside
int bri 0
ip nat outside
exit
ip nat pool  remotepool 150.50.50.10 150.50.50.20 prefix-length 24
ip nat inside source list 1 pool  remotepool
access-list 1 permit 172.16.2.0 0.0.0.255
```

```
remote#show run
Building configuration...

Current configuration:
!
version 12.0
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname remote
!
enable secret 5 $1$T2C9$cmSb/FkCH2rzpn8gXc2q3.
enable password 12345
!
username corp password 0 12345
!
ip subnet-zero
!
isdn switch-type basic-ni
!
interface Ethernet0
 ip address 172.16.4.1 255.255.255.0
 no ip directed-broadcast
 ip nat inside
!
interface BRI0
 ip address 150.50.50.1 255.255.255.0
 no ip directed-broadcast
 ip nat outside
 encapsulation ppp
 dialer idle-timeout 60
 dialer map ip 150.50.50.2 name corp 8358662
 dialer-group 2
 isdn switch-type basic-ni
 isdn spid1 0835866101 8358661
 isdn spid2 0835866301 8358663
 ppp authentication chap
!
ip nat pool remotepool 150.50.50.10 150.50.50.20 prefix-length 24
ip nat inside source list 1 pool remotepool
no ip http server
ip classless
ip route 0.0.0.0 0.0.0.0 150.50.50.2
ip route 172.16.2.0 255.255.255.0 150.50.50.2
!
access-list 1 permit 172.16.4.0 0.0.0.255
dialer-list 2 protocol ip permit
!
line con 0
 transport input none
 stopbits 1
line vty 0 4

corp#
corp#sh run
Building configuration...

Current configuration:
```

255.255.255.0.

If you want to change this. then your neighbors router should be changed as well. (eg. change to 25.26.27.28)

```
!
version 12.0
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname corp
!
enable secret 5 $1$3AzC$3B20rbXLpZXpUbiXLYm6y0
enable password 12345
!
username remote password 0 12345
!
ip subnet-zero
!
isdn switch-type basic-ni
!
!
!
interface Ethernet0
 ip address 172.16.2.1 255.255.255.0
 no ip directed-broadcast
!
interface BRI0
 ip address 150.50.50.2 255.255.255.0
 no ip directed-broadcast
 encapsulation ppp
 dialer idle-timeout 180
 dialer map ip 150.50.50.1 name remote 8358661
 dialer-group 2
 isdn switch-type basic-ni
 isdn spid1 0835866201 8358662
 isdn spid2 0835866401 8358664
 ppp authentication chap
!
no ip http server
ip classless
ip route 0.0.0.0 0.0.0.0 150.50.50.1
ip route 172.16.4.0 255.255.255.0 150.50.50.1
!
dialer-list 2 protocol ip permit
!
line con 0
 transport input none
 stopbits 1
line vty 0 4
 password 12345
 login
!
end

corp#

remote#show ip nat ?
  statistics    Translation statistics
  translations  Translation entries

remote#debug ip nat ?
  <1-99>    Access list
  detailed  NAT detailed events
```

```
  <cr>

remote#clear ip nat ?
  statistics   Clear translation statistics
  translation  Clear dynamic translation

remote#clear ip nat translation ?
  *        Delete all dynamic translations
  inside   Inside addresses (and ports)
  outside  Outside addresses (and ports)
  tcp      Transmission Control Protocol
  udp      User Datagram Protocol
remote#debug ip nat
IP NAT debugging is on
remote#
00:44:05: NAT: s=172.16.4.99->150.50.50.10, d=172.16.2.1 [56065]
00:44:25769844736: %LINK-3-UPDOWN: Interface BRI0:1, changed state to up
00:44:06: NAT: s=172.16.4.99->150.50.50.10, d=172.16.2.1 [56321]
00:44:07: NAT: s=172.16.4.99->150.50.50.10, d=172.16.2.1 [56577]
00:44:07: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:1, changed state to up
00:44:08: NAT: s=172.16.4.99->150.50.50.10, d=172.16.2.1 [56833]
00:44:12: %ISDN-6-CONNECT: Interface BRI0:1 is now connected to 8358662 corp
remote#
remote#show ip nat translations
Pro Inside global      Inside local       Outside local      Outside global
--- 150.50.50.10       172.16.4.99        ---                ---
remote#
remote#show ip nat translations verbose
Pro Inside global      Inside local       Outside local      Outside global
--- 150.50.50.10       172.16.4.99        ---                ---
    create 00:00:36, use 00:00:33, left 23:59:26, flags: none
remote#
remote#show ip nat statistics
Total active translations: 1 (0 static, 1 dynamic; 0 extended)
Outside interfaces:
  BRI0, BRI0:1, BRI0:2
Inside interfaces:
  Ethernet0
Hits: 35  Misses: 2
Expired translations: 0
Dynamic mappings:
-- Inside Source
access-list 1 pool remotepool refcount 1
 pool remotepool: netmask 255.255.255.0
      start 150.50.50.10 end 150.50.50.20
      type generic, total addresses 11, allocated 1 (9%), misses 0
remote#
remote#
```

```
remote#debug ip nat detailed
IP NAT detailed debugging is on
remote#
remote#
00:46:16: NAT: i: icmp (172.16.4.99, 256) -> (172.16.2.1, 256) [57601]
00:46:73014484992: %LINK-3-UPDOWN: Interface BRI0:1, changed state to up
00:46:18: NAT: i: icmp (172.16.4.99, 256) -> (172.16.2.1, 256) [57857]
00:46:18: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:1, changed state to up
00:46:19: NAT: i: icmp (172.16.4.99, 256) -> (172.16.2.1, 256) [58113]
00:46:20: NAT: i: icmp (172.16.4.99, 256) -> (172.16.2.1, 256) [58369]
00:46:23: %ISDN-6-CONNECT: Interface BRI0:1 is now connected to 8358662 corp
remote#
remote#show ip nat translations
Pro Inside global      Inside local       Outside local      Outside global
--- 150.50.50.10       172.16.4.99        ---                ---
remote#
remote#clear ip nat translation *
remote#
00:46:59: NAT: deleting alias for 150.50.50.10
remote#sh debug
Generic IP:
  IP NAT detailed debugging is on
remote#
00:52:14: NAT: i: udp (172.16.4.99, 137) -> (172.16.2.99, 137) [63489]
00:52:14: NAT: installing alias for address 150.50.50.10
00:52:64424550400: %LINK-3-UPDOWN: Interface BRI0:1, changed state to up
00:52:16: NAT: i: udp (172.16.4.99, 137) -> (172.16.2.99, 137) [63745]
00:52:16: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0:1, changed state to up
00:52:17: NAT: i: udp (172.16.4.99, 137) -> (172.16.2.99, 137) [64001]
00:52:19: NAT: o: icmp (172.16.4.1, 256) -> (172.16.4.99, 256) [85]
00:52:19: NAT: o: icmp (172.16.4.1, 256) -> (172.16.4.99, 256) [86]
00:52:19: NAT: o: icmp (172.16.4.1, 256) -> (172.16.4.99, 256) [87]
00:52:19: NAT: o: icmp (172.16.4.1, 137) -> (172.16.4.99, 137) [88]
00:52:20: NAT: o: icmp (172.16.4.1, 137) -> (172.16.4.99, 137) [89]
00:52:21: %ISDN-6-CONNECT: Interface BRI0:1 is now connected to 8358662 corp
00:52:22: NAT: o: icmp (172.16.4.1, 137) -> (172.16.4.99, 137) [90]
00:52:24: NAT: i: icmp (172.16.4.99, 256) -> (172.16.2.99, 256) [258]
00:52:27: NAT: i: icmp (172.16.4.99, 256) -> (172.16.2.99, 256) [514]
00:52:30: NAT: i: icmp (172.16.4.99, 256) -> (172.16.2.99, 256) [770]
```